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ADMINISTRATIVE OFFICE: American Meteorological Society, Office of Executive Secretary, 3 Joy Street, Boston 8, Mass.

* Address all business communications, orders and inquiries to the Executive Secretary, Mr. Kenneth C. Spengler, 3 Joy Street, Boston 8, Mass. Exchanges and reprints may be sent direct to P. O. Box 1736, Washington 13, D. C.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

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This publication has been made possible through support and sponsorship extended by the Geophysics Research Directorate of the Air Force Cambridge Research Center, Air Research and Development Command, under Contract No. A. F. 19 (604)-2062.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 8 JULY, 1957 No. 7

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MAIN

AGRICULTURE · COMMERCE · AERIAL AND MARINE NAVIGATION · PUBLIC HEALTH · INDUSTRY · ENGINEERING
AMERICAN METEOROLOGICAL SOCIETY
1919

SPECIAL FEATURE IN THIS ISSUE

Annotated Bibliography on Albedo

By

Sigmund Fritz and Malcolm Rigby

Prepared for
U. S. Army Quartermaster Research and Development Center
Environmental Protection Division

(*For complete table of contents see back cover*)

Published monthly at Prince and Lemon Streets, Lancaster, Pa., by the AMERICAN METEOROLOGICAL SOCIETY, 3 Joy Street, Boston 8, Mass.

Printed and issued by: Lancaster Press, Inc.

851
A62
1957
July-Dec.
no. 6

FOREWORD

1127

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises an annotated bibliography of important references on a special subject (usually arranged chronologically). No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
5. Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
9. Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

1. Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
5. Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm Detect.
9. Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	

Vol. III, 1952

1. Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
5. Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
9. Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

1. Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc
5. High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
9. Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

1. Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
5. Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
9. Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Vol. VI, 1955

1. Bibliog. of Bibliog.	2. Texts & Monogr. Bibliogs.	3. Storm Surges
4. Ionospheric Prop.	5. Photochem.—Upper Atmos.	6. Cloud Physics
7. Radar Cloud Physics	8. Atmos. Nuclei (1841–1950)	9. Atmos. Nuclei (1951–1955)
10. Weather Modification	11. Cooling Power	

Vol. VII, 1956

1. Synoptic Met.-Arctic	2. Clim. of Enclosed Spaces	3. Cosmic Rays (–1952)
4. Cosmic Rays (1953–56)	5. Atmos. Radioactivity	6. Inversions
7. Snow Micromet.	8. Snow Micromet. (Suppl.)	9. Tropical Cyclones
10. Hurricane Damage	11. Tropical Cyclone Theory	

Vol. VIII, 1957

1. Solar Relations with Weather	4. Forest Micrometeorology	7. Albedo
2. Night Airglow	5. Hydrometeorological Forecasting	
3. Forecasting of Special Elements	6. Numerical Forecasting (Suppl.)	

Other bibliographies in preparation are:

Actinometers	*Ozone*
Human Bioclimatology	*Radio Astronomy*
Meteors	*Singularities*
Microwave Propagation	*Synoptic Aerology*

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue comprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (Vol. 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

8.7–1 551.578.30

U. S. Weather Bureau, **Drought.** Its *Weekly Weather and Crop Bulletin*, 44(1a):1–12, Jan. 10, **1957.** 22 figs., 3 tables. **DWB, DLC, DA**—Contents: Waggoner, M. L., **Normal precipitation for the United States,** p. 2. Mitchell, J. Murray, Jr., **When and where the current drought began,** p. 3. Blanc, Milton L., **Chronology of the drought of 1952–56,** p. 3–5. Swenson, Bennett, **Low water stages in Mississippi River and other areas,** p. 5–6. Palmer, Wayne C., **Drought—a normal part of climate,** p. 6–8. Blanc, M. L., **Drought and cloud seeding,** p. 8. Schloemer, R. W., **Precipitation expectancies,** p. 8–9. Palmer, Wayne C., **Climatic risk,** p. 9–10. Palmer, Wayne C. and Creasi, Vincent J., **Year to year variability of rainfall,** p. 10. Mitchell, J. Murray, Jr., **How unusual is the drought?,** p. 10–12. Namias, Jerome, **Causes of drought and factors bearing on its prediction,** p. 12. Notes and charts showing the duration, intensity, origin, development, chronology and character of the drought of 1952–1956 in the Great Plains and Southwest are presented in this report intended for use by other Gov't. agencies and the public. In some areas a deficiency of 2-years precipitation was experienced during the 5 years, 1952–6, when compared with normal rainfall (1921–50). Soil moisture conditions are also treated. Cycles, trends, variability and forecasting of drought are discussed as well. *Subject Headings:* **1. Drought, Great Plains (1952–56) 2. Great Plains, U. S.**—*M.R.*

8.7–2 551.57:061.3

Hu, —., **III. celostátní hydrometeorologická konference.** [Third National Hydrometeorological Conference.] *Meteorologické Zprávy*, Prague, 7(6):141–152, **1954.** Russian and English summaries p. 141. Also: Lorenz, Jan, [same title]. *Ibid.*, 8(1):1–11, Feb. 28, **1955. DLC**—At this meeting held in Prague in Sept. 1954, 28 papers in meteorology and 22 in hydrology were delivered. The 1954 issue includes substantial summaries (in Czech.) of the following meteorological papers:

Konček, M., **Kritéria pre vymedzenie prirodzených klimatických oblastí.** [Criteria for determining natural climatic regions.]

Novák, V., **Hydrologický rok ve vztahu k vegetační době a půdotvorným procesům.** [The hydrologic year in relation to the growing season and soil-forming processes.]

Dokládal, J., **Příspěvek k poznání vlivu rybníků na podnebí u nás s hlediska zemědělského.** [Effect of lakes on climate in Czechoslovakia from the point of view of agriculture.]

Smolík, Ladislav, **Poznámky k mikroovzduší rybníků.** [Notes on the micrometeorology of lakes.]

Krečmer, V., **Klimatická funkce lesů.** [Climatic function of forests.]

Kurperlová, M., **Fenologický príspevok k vymedzeniu prirodzených klimatických oblastí na Slovensku.** [Phenological contribution to the determination of natural climatic regions in Slovakia.]

Trefná, E. and Mareček, F., **Meteorologie pomocníkem při pěstování skleníkových rostlin.** [Meteorology as an aid in hothouse plant growing.]

Pejml, K., **O používání empirických vzorců v předpovědi nočních mrazů.** [Use of empirical functions in night frost forecasting.]

Gregor, A., **Klimogramy v bioklimatologii.** [Climographs in bioclimatology.]

Petr. B. **Pokusy o stanovení tepelné pohody lidského organismu v závislosti na meteoro-**

logických činitelích. [Determination of the thermal comfort of the human organism as a function of meteorological factors.]

Švorcová, Š., **Onemocnění horních cest dýchacích v souvislosti s náhlými přechody front.** [Diseases of the upper respiratory tracts connected with sudden frontal passages.]

Kacvinská, K., **Zhodnotenie aktinometrických meraní v Hurbanove za rok 1939–1953.** [Evaluation of actinometric measurements at Hurbanovo for 1939–1953.]

Stružka, V., **Nekteré otázky dnešní biometeorologie.** [A few current problems in biometeorology.]

Kozumplík, S., **Součtová metoda pro klimatická a agrometeorologická měření—návrh na jednotné zavedení.** [Summation technique for climatic and agrometeorological measurement—a proposal for general adoption.]

Krhounek, S., **Srovnání výsledků měření promrzání půdy s výsledky měření půdními teploměry.** [Comparison of results of measurements of soil freezing with results obtained with soil thermometers.]

Brablec, J., **Předpověď všeobecného počátku žní ozimého žita v r. 1954.** [Forecasting the data of winter-wheat harvesting in 1954.]

Brablec, J., **Poznámky z komplexní kombajnové sklizně v Býkvi u Mělníka.** [Notes on harvesting by combine at Bykev near Melník.]

Podzimek, J., **Fysika oblaků a její současný stav.** [Cloud physics and its present state.]

Vrána, J., **Synoptická situace a provoz na letišti v Ruzyni.** [Synoptic situation, and activities at Ruzyne airport (Prague).]

Korejs, Z., **Horizontální mapy vertikální stability.** [Horizontal maps of vertical stability.]

Förchtgott, J., **Návrh metody pro výzkum vlnových deformací vzdušných proudů a turbulence v ovzduší.** [A proposed method for the analysis of wave deformations of atmospheric currents and of atmospheric turbulence.]

Gregor, Z., **Výsledky měření výškového větru v Popradě.** [Results of upper wind measurements at Poprad.]

Novák, V., and Havlíček, V., **Potřeba unifikace metod klimatického prostorového průzkumu.** [Need for unification in regional climatic research.]

Pícha, J., **Změna klimatu ve střední Evropě za posledních 175 let.** [Climatic changes in central Europe during the last 175 years.]

Rein, F., **Vliv terénu na počet srážkových dní.** [Effect of terrain on the number of rainy days.]

Briedoň, V., **O výške snehovej pokrývky na Hornej Orave.** [Snow cover depth in Upper Orava.]

Martinec, J., **Automatické měření hustoty sněhu radioaktivními isotopy.** [Automatic measurement of snow density by means of radioisotopes.]

Konček, M., **Úlohy klimatológie v rámci geografických vied v ČSR.** [The role of climatology among the geographical sciences in Czechoslovakia.]

The 1955 issue contains summaries of the hydrological papers and resolutions passed by the Conference regarding future work in Czechoslovakia in meteorology, climatology and hydrology. Among the papers in this section the following are of particular meteorological interest:

Bratránek, Alois, **Možnosti predpovědí průtoků a jejich praktické využití pro vltavské nádrže.** [Methods of forecasting discharge and their application to the Vltava dams.]

Zajíčková-Kytlicová, Ludmila, **Výpar z vodních hladín v Čechách a na Moravě.** [Evaporation from water surfaces in Bohemia and Moravia.]

Subject Headings: 1. **Hydrometeorological Conferences** 2. **Third National Hydrometeorological Conference, Prague, 1954.**—*G.T.*

8.7–3 551.46:01.7

†**Papers in marine biology and oceanography, dedicated to Henry Bryant Bigelow by his former students and associates on the occasion of the twenty-fifth anniversary of the founding of the Woods Hole Oceanographic Institution, 1955.** London, New York, Pergamon Press, **1955.** 498 p. port., numerous figs., tables and eqs., refs. at end of each chapter Supplement to V. 3 of **Deep-sea Research.** "Bibliography of Henry Bryant Bigelow"

p. xviii–xx. **DLC**—A collection of about 50 papers, mostly in the sphere of marine biology, prepared by the students and friends of HENRY BRYANT BIGELOW who is credited with doing more than any other American to bring oceanography from its subordinate and heterogeneous state 50 years ago to its recognized place today as one of the main branches of science both in research and in university status. Several of the papers, which will be analyzed separately, deal with physical oceanography or hydrography. The Foreword (p. xi–xvii) gives an enthusiastic biography of BIGELOW, followed by a thorough bibliography of 85 of his works from 1902–1955, most of those since 1925 written in collaboration with one or another of his students. (For listing of contents, *see* Pt. 3, p. 407, March 1957, *MAB.*) *Subject Headings:* **1. Biography of Henry Bryant Bigelow 2. Bibliography of Henry Bryant Bigelow. I. Woods Hole Oceanographic Institution II. Bigelow, H. B.**—*M.R.*

8.7–4 551.46(041)

Johns Hopkins University. Chesapeake Bay Institute, **Collected Reprints,** Vol. 2, 1953–1954, pub. May 1955. Reprints No. 7–20. **DWB**—Contents: No. 7, Burt, W. V., **A note on the reflection of diffuse radiation by the sea surface.** No. 8, Powers, M. C., **New roundness scale for sedimentary particles.** No. 9, Powers, M. C. and Kinsman, B., **Shell accumulations in underwater sediments and their relation to the thickness of the traction zone.** No. 10, Carritt, D. E., **Chemical measurements.** No. 11, Carritt, D. E., **Separation and concentration of trace metals from natural waters.** No. 12, McGary, James W., **Substandard reference solutions in chlorinity determinations by the Knudsen method.** No. 13, Burt, W. V., **Extinction of light by filter passing matter in Chesapeake Bay waters.** No. 14, Pollak, M. J., **Static stability parameters in oceanography.** No. 15, Pritchard, D. W., **Distribution of oyster larvae in relation to hydrographic conditions.** No. 16, Pritchard, D. W., **A study of the salt balance in a coastal plain estuary.** No. 17, Burt, W. V., **Albedo over wind-roughened water.** No. 18, Carritt, D. E. and Goodgal, Sol, **Sorption reactions and some ecological implications.** No. 19, Pollak, M. J., **The use of electrical conductivity measurements for chlorinity determination.** No. 20, Carritt, D. E., **Atmospheric pressure changes and gas solubility.** *Subject Headings:* **1. Oceanography 2. Reprints 3. Marine meteorology.**

TEXTBOOKS

8.7–5 551.5(02) 551.509

†Godske, C. L.; Bergeron, Tor; Bjerknes, Jakob A. V. and Bundgaard, Robert C., **Dynamic meteorology and weather forecasting.** In continuation of **Dynamic meteorology and hydrography** (by V. Bjerknes and collaborators) and **Hydrodynamique physique avec applications à la météorologie dynamique** [Physical hydrodynamics with applications to dynamic meteorology] (by) V. Bjerknes; J. Bjerknes; H. Solberg and T. Bergeron. Published jointly by American Meteorological Society, Boston, and by Carnegie Institution of Washington, Wash., D. C., **1957.** (Foreword dated 1949; Manuscript submitted Feb. 1951). 800 p. numerous figs., tables, eqs. Bibliog. at end of each chapter. *Carnegie Institution of Washington, Publication,* No. 605. **DLC.** Review by Sverre Petterssen in *Science,* Wash., D. C., 125(3252):829–830, April 26, **1957. DLC**—Next to the **Compendium of Meteorology,** this monumental and long-awaited text is the most impressive work on meteorology of the decade. The work of revising and bringing up to date the classical work of V. and J. BJERKNES, et al. (1933–34) on **Physical hydrodynamics** was completed in 1948, before the death of the elder BJERKNES (who wrote the Preface in Feb. 1949, and to whose memory the volume is dedicated). The delay of 8 years in publication is easily understood when one peruses the various chapters and sees how stupendous was the task of editing, proofing and publishing all of the detailed theoretical material. Since most of the progress in meteorology in the past decade has been along lines of mechanization, automation and the like, the basic material in the book has not depreciated in the interim—only a few topics such as microwave (radar) meteorology, numerical prediction, turbulent diffusion, the jet stream and cloud physics, have not been treated as fully as would be the case if the book were written today. It is not possible to mention the titles of the 109 sub-chapters arranged under 18 major chapters. The 6 parts are: I. Thermodynamics and statics of the atmosphere—(1) thermodynamics, (2) statics, (3) quasi-static diagnosis of atmospheric fields, (4) radiation processes;

II. Kinematics of the atmosphere—(5) the vector field, (6) simple kinematic processes and principles, (7) 2-dimensional kinematic methods in forecasting; III. Hydrodynamics of the atmosphere—(8) atmospheric equations of motion and circulation theorems, (9) oscillating and circulating motions, (10) Wave theory of cyclones and applications, (11) Vorticity, gradient winds, divergence and orographic effects, (12) turbulence; IV. Climatological and Synoptic Models—(13) average fields of temperature, pressure, heat transfer, etc., (14) air masses and fronts, (15) dynamical analysis of cyclones and anticyclones, (16) atmospheric tides and thermal, orographic, frictional and local modification of disturbances or currents; VI. Weather Forecasting—(17) synoptic analysis (observation codes, surface, upper air and composite maps), (18) forecasting (numerical, synoptic, special and extended). Excellent bibliographies, running into over 1000 completely cited references are appended to each chapter. The historical and mid-historical material along the lines of the above subjects are not by any means slighted—very little material after 1948 (some as late as 1951) has been incorporated. *Subject Headings:* **1. Dynamic meteorology textbooks 2. Synoptic meteorology textbooks 3. Meteorology bibliographies. I. Bjerknes, V.**—*M.R.*

8.7–6 551.590.21(02)

Ellison, Merbyn Archdall (*Royal Observ., Edinburgh*), **The sun and its influence: an introduction to the study of solar-terrestrial relations.** London, Routledge and Kegan Paul, **1955.** 235 p. 54 figs., 9 plates, 9 tables, bibliog. p. 225–230. Price: 21 sh. **DLC** (QB531.E4 1955). Review by J. Pepper in *Royal Meteorological Society, Quarterly Journal,* 82(354):549–550, Oct. **1956.** Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A,* 9(3):428–430, **1956. DLC**—The latest discoveries in various fields of astro- and geophysics connected with solar-terrestrial relationships (not including solar-weather relations) are woven into this systematic yet readable book on the sun, its radiations, atmosphere, disturbances, etc. and their effects on cosmic ray, geomagnetic, ionospheric, and auroral and radio phenomena or disturbances. Many excellent schematic drawings, photos and tables are included. *Subject Headings:* **1. Solar-terrestrial relationships 2. Solar-ionospheric relationships 3. Textbooks on solar influences.**—*M.R.*

8.7–7 551.58(02)

§†*Gulubov, Zh. S., **Obshta klimatologiia.** [General climatology.] Sofia, Bulgaria, Durzhavno Izdatvo Nauka Izkustvo, [**1953**]. 284 p. 127 figs. (some fold.), 89 tables, bibliogs. throughout. **DLC** (QC981.G8)—The meteorological factors affecting the geographical climate are treated in detail in the first 3 of the 5 major sections of the book. The chapters cover the history and concept of climatology, structure and composition of the atmosphere, radiation, heat balance, temperature, pressure, wind, moisture, evaporation, cloudiness, precipitation, general circulation, cyclones, etc., continentality, marine and topographic influences, vegetation and microclimate. In Pt. 4, the various classifications based on different concepts or applications, and some of the zonal climates of the earth are treated. In Pt. 5 the cosmic and telluric influences on climate and quaternary climates are discussed. Extensive bibliographies (mostly of Russian source material) are appended to each section. The text is rich in illustrative data in tabular and graphic form and in theory. The general approach is synoptic-dynamic with little of the regional or ecological point-of-view evident. *Subject Headings:* **1. Climatology textbooks 2. Dynamic climatology.**—*M.R.*

8.7–8 551.521(02)

Kondrat'ev, K. Ia., **Luchistyĭ teploobmen v atmosfere.** [Radiant heat exchange in the atmosphere.] Ed. by P. N. Tverskoĭ. Leningrad, Gidrometizdat, **1956.** 419 p. 105 figs. 71 tables, 390 refs., eqs. **DLC** (QC880.K63)—In 1950 the author published a monograph on **Transfer of long wave radiation in the atmosphere** (*see* 3.4–5, April 1952, *MAB*) and in 1954 one on direct (short wave) solar radiation (*see* 8.5–8, May 1957, *MAB*). The present text is a more exhaustive treatment of the problems of the thermal and radiation balance of the atmosphere and the earth's surface, by way of supplementing the material in the book on solar radiation. The general theory of black body radiation and of radiation exchange is found in Ch. I. Successive chapters deal with: II, Actinometric measurement and analysis of data; III, Absorption of long wave radiation in the atmosphere and methods (including

graphical) of calculation; IV, Calculation of radiant heat transfer in atmosphere; V, Calculation of radiant heat balance in the atmosphere; VI, Counter radiation and radiation from underlying surface; VII, Empirical results of studies of radiation balance of the active surface, methods and results of theoretical calculations; VIII, Actual calculation of temperature changes in the atmosphere from knowledge of radiation balance, turbulent transfer, etc. The book contains, in addition to extensive treatment of theoretical aspects, the solutions by approximate methods of a number of practical problems concerned with radiation balance of oceans, lakes, glaciers, crops, snow cover, forests, soils, hotbeds, frost pockets, slopes, etc., and sample data showing the quantitative results of seasonal changes in radiation balance, plus nomograms and tables for making these calculations. An excellent, up-to-date bibliography is also included. In fact most of the work on which the text is based was performed in the six years, 1950–55, inclusive, most of it in the U.S.S.R., but a goodly portion in other countries (e.g., the absorption by CO , O_3, H_2O, etc., radiation balance over a snow cover in the Sierras or over the ocean, i.e., works by GOODY, PLASS, MÖLLER, DEACON, L. KAPLAN, D. MILLER, DINGLE and others). *Subject Headings:* **1. Radiation balance 2. Textbooks.** —*M.R.*

8.7–9 551.511(02)

†*Laĭkhtman, D. L. and Iudin, M. I. (*eds.*), **Osnovy dinamicheskoĭ meteorologii.** [Principles of dynamic meteorology.] Leningrad, Gidromet. Izdat., **1955.** 646 p. 144 figs. (some fold.), 42 tables, 65 refs., eqs. **DLC** (QC861.L26)—This textbook of dynamic meteorology is based upon courses taught at the University of Leningrad and at the Leningrad Hydrometeorological Institute. It is a comprehensive mathematical treatment (using differential equations rather than vector analysis) of the entire field of dynamic meteorology. The book is divided into 5 parts and 18 chapters: fundamental equations of the dynamics of the atmosphere, analysis and simplification of the equations of dynamics of the atmosphere, thermodynamics of a dry atmosphere, and in saturated air, thermal convection in the atmosphere, radiation energy in the atmosphere, statics of the atmosphere, wind in the free atmosphere, aperiodic variations of pressure and temperature, temporal variation of pressure under the influence of dynamic factors, surface boundary and waves in the atmosphere, distribution of the meteorological elements in the surface layer of the atmosphere, energetics of the atmosphere and structure of meteorological fields, local circulations in the atmosphere, temperature regime of the atmosphere and general circulation of the atmosphere. *Subject Heading:* **1. Dynamic meteorology textbooks. I. Gandin, Lev Semenovich II. Matveev, L. T.**—*I.L.D.*

8.7–10 551.5(02)

†Okada, Takematsu, **Kisho-gaku-tsuron.** [General meteorology.] Tokyo, Iwanami Book Co., Ltd., **1949.** 259 p. 97 figs., foot-refs., numerous eqs. In Japanese. **DLC** (Orientalia)—The most popular meteorological textbook in Japan for beginning courses in the university. Classical treatment. This is a new edition of the author's **Kisho-gaku-kowa,** [Popular treatise on meteorology], (pub. Tokyo, Iwanami Book Co., Ltd., **1928.** 329 p. 88 figs., tables and plates). The 28 chapters are entitled: 1) Atmosphere, 2) Temperature, 3) Barometric pressure, 4) Humidity, 5) Evaporation and condensation, 6) Thaw and dew, 7) Fog, 8) Cloud, 9) Rain, 10) Snow, 11) Ice, 12) Hail, 13) Rainfall, 14) Sunshine and cloudiness, 15) Solar radiation, 16) Wind, 17) Large scale wind system, 18) Local wind system, 19) Waterspout and thunderstorm, 20) Anticyclone, 21) Cyclone, 22) Tropical cyclone, 23) Air-mass and front, 24) Optical phenomena, 25) Atmospheric electricity, 26) Atmospheric acoustics, 27) Aerology, 28) Weather forecasting. *Subject Headings:* **1. Meteorology textbooks 2. Japanese language textbooks.**—*H. Arakawa.*

8.7–11 551.5(09)

Okada, T., **Sekai Kishogaku Nenpyo,** [Chronology of weather science.] Rev. by H. Arakawa. Tokyo, Chizin Shokan Co., **1956.** 229 p. figs., ports., tables.—An unusually thorough and imaginative chronological history of meteorology from 1442 to 1956 with a 24-page systematic summary and with separate discussion of events of importance year by year. Although the text is all in Japanese, the references to authors and publications from western sources give a clue to the events that OKADA and ARAKAWA consider outstanding for each year included in the chronology. There are one or more entries for nearly every year from 1870

to date. Photos of many famous people, including recent workers such as ROSSBY, H. WEXLER, PALMÉN, FULTZ, NORMAN PHILLIPS and others. Considerable emphasis is placed on publication events such as textbooks, compendiums, periodicals (e.g., Meteorological Abstracts and Bibliography, p. 218) and symposia. Data and diagrams are also included in appropriate places. ARAKAWA has revised OKADA's work from 1941–1956. *Subject Headings:* **1. History of meteorology 2. Meteorological chronologies. I. Arakawa, H.** (*ed.*).—*M.R.*

8.7–12 551.507.321.2(02)

*Tanatar, I. Ia., **Aerologiia: metod sharov-pilotov, nabliudaemykh s odnogo punkta.** [Aerology: single station method of pilot balloon observation.] Moscow, Voen.-Izdat., **1948.** [174 p.] illus., 145 figs., maps, 34+ tables, 20×28 cm. Photostat. (346 p. in original). **DLC** (QC879.T35)—A detailed manual or textbook for students in civilian or military courses of elementary meteorology in the U.S.S.R. The first part defines aerology and shows dozens of types of aerological instruments or carrying devices (from kites to sounding balloons, pilot balloons and radiosondes). Ch. 1 goes into the basic theory of single station pilot balloon ascent, with numerous tables and equations; Ch. 2 takes up the methods of working up pibals and determining winds; Ch. 3, the theodolite, its construction, use and errors (several types including the self-recording theodolite are described and illustrated); Ch. 4, hydrogen and balloons (inflation devices, types of balloon fabric, methods of filling, sources of gas); Ch. 5, orientation and compilation, coding, night ascents; Ch. 6, sources and determination of errors in speed and direction of wind. Computation tables, forms for recording, charts showing time belts in U.S.S.R. magnetic declination, etc. are appended. *Subject Headings:* **1. Pilot balloon manuals 2. Aerological textbooks 3. U.S.S.R.**—*M.R.*

POPULAR BOOKS AND ARTICLES

See also: **The seven seas** (Gagel), 8.7–62; **Weather forecast** (McAllen), 8.7–131.

8.7–13 523.5

*Watson, Fletcher Guaard, **Between the planets.** Rev. ed. Cambridge, Mass., Harvard Univ. Press, **1956.** 188 p. 53 figs., 67 photos, 31 tables. **DWB.** Review by P. Graystone in *Meteorological Magazine*, London, 86(1017):92–93, March **1957.** **DWB**—A small volume covering systematically the latest information on interplanetary conditions, comets, meteor showers, meteorites, radio and radar observations of meteors, meteor craters, explosions, trails, ionization, etc. The zodiacal light, interplanetary dust, the ionosphere and case histories of great meteor falls are vividly described and illustrated. A good amount of quantitative data is included, but little theory or technical information. *Subject Headings:* **1. Meteors 2. Interplanetary conditions 3. Siberian meteors.**—*M.R.*

8.7–14 551.5(02)

Wyler, Rose, **The first book of weather.** New York, Watts, **1956.** 63 p. illus. **DLC**—An elementary book on weather and weather processes, evidently intended for 6th or 7th grade students or classes specializing in study of weather and climate. The illustrations are colorful and vivid, and clearly demonstrate the physical processes involved in atmospheric composition, physics, dynamics, moisture exchange, precipitation, thunderstorms, and local forecasting. Each of these phenomena, as well as many others (tornados, fog and smog, dew and frost, hail and ice, snow, air masses, winds, hurricanes, raindrops, the weather map, observations, etc.) provide the subject matter for separate chapters. *Subject Heading:* **1. Elementary meteorology textbooks.**—*M.R.*

8.7–15 551.46

Piccard, Auguste, **Au fond des mers en bathyscaphe.** [To the sea bottom in a bathyscaphe.] Paris, Arthaud, **1954.** 291 p. 28 figs., 49 photos. **DLC** (VM989.P5). Also trans. into English by Christina Stead as **Earth, Sky and Sea.** N. Y. Oxford Univ. Press, **1956.** 192 p. 28 figs., 22 photos. **DLC.** Pub. as **In balloon and bathyscaphe.** London, Cassell,

1956. Review by I. E. Wallen in *Scientific Monthly*, Wash., D. C., 84(1):44–45, Jan. 1957. **DLC**—In Ch. I (p. 1–18) of this fascinating and well illustrated book, the author tells some of his personal experiences during the two record-breaking ascents into the stratosphere in his stratostat "FNRS" on May 27, 1931 to 51,000 ft over the Bavarian Alps, and on Aug. 18, 1932 to 53,400 ft over the Swiss Alps. The balloon was globular and the Calein was also spherical (2.1 m inside diameter) and as small as possible without sacrificing comfort too much. The analogies between the stratostat and its counterpart, the bathyscaphe (FNRS 2, FNRS 3 and the Trieste), are brought out in numerous ways. These bathyscaphes, all designed by the author, differ from the usual bathysphere in that: (1) they do not have any cable connecting with the surface, thus avoiding the risk of being cut off by accident from return to the surface, (2) are not subject to rocking arising from the wave motions action on the surface craft, and (3) can safely land and rest on the bottom of the sea. They also have portholes through which observations of submarine life and geology can be made. The author presents drawings and describes in great detail the construction problems, outfitting, launching and scientific results of several ascents and of descents [with or without crew, of the 3 types of bathyscaphes, in 1948, 1953 and 1954, during which depths of 1650 fathoms were reached with a crew and 2200 fathoms (4050 m.) without a crew]. The mesocaphe—a submarine helicopter proposed for exploring medium depths (to 1000 fathoms) is described, and oceanography of the future speculated on. *Subject Headings:* **1. High altitude balloon ascents 2. Aerostats 3. Bathyscaphs 4. Deep sea descents.**—*M.R.*

8.7–16 551.584(02)

Rusin, Nikolaĭ Petrovich, **Klimat sel'skokhoziaĭstvennykh poleĭ.** [Climate of cultivated fields.] Leningrad, Gidrometizdat, **1955.** 74 p. 18 figs., 16 tables, foot-refs. **DLC** (S600.R75)—This pamphlet for widespread use (26,500 copies) by agricultural technicians and meteorologists, gives in condensed form many details of extreme importance for a knowledge of crop relations to weather, climate, and topography. The first chapter (microclimate and its processes) goes into the microclimate of any kind of a field, heat and moisture balance, soil temperature, air temperature above soil, etc. Ch. II takes up the microclimate of cultivated fields, heat moisture and light in soil and crops, influence of humidity of air on evaporation and evapotranspiration from plants, influence of wind and snow cover on microclimate. Ch. III goes into practical applications of knowledge of microclimatology, such as forecasting, frost protection, climatic amelioration, etc. Many numerical and graphical examples are cited from Russian practice in agro- and microclimatology. *Subject Headings:* **1. Microclimatology textbook 2. Agricultural meteorology 3. Field microclimatology.**—*M.R.*

MONOGRAPHS

See also: **Réseau Mondial 1933 [and] 1934** (Gt. Brit. Met. Off.), 8.7–116; **Flood studies in small basins, Fr. Equatorial Africa** (Rodier), 8.7–293; **Albedo of Antarctic snow field** (Liljequist), 8G–166.

8.7–17 551.582.1:711(434.3)

Barners, Ernst, **Landnutzung und agrargeographische Struktur des Bitburger Landes.** [Land use and agro-geographical structure of the Bitburg.] *Arbeiten zur Rheinischen Landeskunde*, Bonn, No. 8, **1955.** 83 p. 41 figs., 11 tables, 193 refs. **DWB**—The climate of the Bitburg region of West Germany (along the Kyll river NE of Luxembourg) is discussed in relation to the agriculture or land use of the region, on p. 7–11 of this monograph. Tables give temperature and precipitation data (by months) and 2 appended charts show total precipitation at a number of places in the area, and phenological data on apple blooming (1934–37), respectively. Hydrological conditions are also treated. Elaborate, colored land use charts are included. Climatological data and concepts are used throughout the monograph in connection with discussions of horticulture, forest (evergreen and deciduous), land forms and land use of small sectors of the region. *Subject Headings:* **1. Climate of Bitburg Region, Germany 2. Agricultural geography monographs 3. Land use charts 4. Bitburg Region, Germany.**—*M.R.*

8.7–18 551.582.2(712)

*Canada. Meteorological Div., **Climatological summary, Alert, N.W.T., Canada, June 1950–Dec. 1953.** pub. **1955.** 71 p. figs. and graphs, almost entirely tables. **DWB**—The surface synoptic observations for each 3-hourly period during May 1950 through Dec. 1953 are presented for each day, with monthly summaries and frequency tabulations of some of the elements, for Alert, N.W.T. (82°30′N, 62°20′W) on the NE corner of Ellesmere Island. This is the last and farthest north of the joint U. S.-Canadian weather stations to be established in the Canadian Arctic. Radiosonde and upper air wind data are also included for Sept. 1950 through Dec. 1953. Mean Jan. and July curves for 0300 and 1500 G.M.T. are presented on elaborate charts. Ceiling-visibility and classified flying weather (by wind speed groups) data are presented for 0230, 0630, 1430 and 2030 L.S.T. and for month, for each month, and for the entire period. (For similar report on Eureka, *see* 3.7-179, July 1952, *MAB*; for Resolute, *see* 4E–222, May 1953, *MAB*.) *Subject Headings:* **1. Climatic data for Alert 2. Alert, N.W.T., Canada.**—*M.R.*

8.7–19 551.594.14:69

†Hultqvist, Bengt, **Studies on naturally occurring ionizing radiations with special reference to radiation doses in Swedish houses of various types.** *Svenska Vetenskapsakademien, Stockholm, Handlingar*, Ser. 4, 6(3), **1956.** 125 p. 52 figs. (incl. photos.), 22 tables, bibliog. p. 114–125, 81 eqs. **DWB** In this comprehensive survey of atmospheric radioactivity research since its beginnings in 1901, physical and biological aspects of the field are reviewed, using some 400 sources from world literature on the subject. Drawing generously on tabular and graphical data and theories contained in the literature quoted, the sources, amount, modification and effects of various types of gamma, beta and atmospheric corpuscular radiation are analyzed. Methods of measurement and instrumentation are described. Radiation effects in the human body are discussed in considerable detail. A great deal of original data obtained in dwellings in Sweden are presented and commented on. These include measurements of gamma ionization in 986 apartments made of different building materials (with recorded values ranging between 4 and 38 ion pairs/cm³ sec), data on radon and thoron content in 61 dwellings and 26 cellars, and radon equivalent in 287 apartments (recorded radon contents between 0.03 and 50.10^{-15} curie/cm³). *Subject Headings:* **1. Radioactivity in houses 2. Sweden.** —*G.T.*

8.7–20 551.579.4(282.272.7)

§†*Lott, George A. and Myers, Vance A. (*both, Hydrologic Services Div., Hydromet. Sect., U. S. W. B.*), **Meteorology of flood-producing storms in the Mississippi River basin.** *U. S. Weather Bureau, Hydrometeorological Report*, No. 34, July **1956.** 226 p. 174 figs., 29 refs. Price: $1.25. **DWB, DLC**—In this comprehensive monograph, 19 major storms which produced floods in the Mississippi River below St. Louis between the years of 1904 and 1951 are analyzed with respect to air masses, fronts, moisture available for precipitation, isobaric and isohyetal patterns, etc. Several large scale and several detailed synoptic charts are presented for each storm situation. The rainfall patterns, wind movements, water vapor transport, dew points, etc., are considered for each case and for the entire period or periods involved (by means of composite or mean charts, diagrams and the like.) The case history of each storm and flood produced thereby, and the general conditions for flood producing rains in different seasons or areas of the watershed are analyzed in the 50 pages or so of text. All of the storms occurred between Dec. and July—none from Aug. to mid-Dec. *Subject Headings:* **1. Flood producing storm analyses 2. Major flood producing storms 3. Mississippi Basin floods 4. Mississippi Basin.**—*M.R.*

8.7–21 551.511

†*Ogneva, Tat'iana Aleksandrovna, **Nekotorye osobennosti teplovogo balansa deiatel'noĭ poverkhnosti: po materialam nabliudeniĭ v Koltushakh.** [Some characteristics of the heat balance of the active surface based on observational data from Koltushi.] Ed. by D. L. Laĭkhtman. Leningrad, Gidrometizdat, **1955.** 119 p. 26 figs., 34 tables, 114 refs., eqs. **DLC** (QC880.O35)—In this monograph, a detailed analysis of 5 years of observational data

(March 1947–Nov. 1951) for a micrometeorological station of the Main Geophysical Observatory at Pavlovo (Koltushi), 10 km from Leningrad, at 59°56′20″N and 30°40′E (in open country) is presented. The literature and theory on turbulent exchange of heat and moisture in the surface layer are reviewed, the observational layout is described and illustrated, methods discussed, the radiation, temperature, wind, humidity, soil temperature, gradients of these elements, diurnal and seasonal variations and variations with clear and cloudy skies are analyzed and summarized, processes of evaporation, radiation, conduction and convection in soil or air are evaluated, and theoretical and experimental results of other authors are compared with the Koltushi results (which are presented in tables and graphs). An excellent bibliography is appended. *Subject Headings:* **1. Heat balance 2. Koltushi, U.S.S.R.**—*M.R.*

8.7–22 551.574.1:551.571

Orr, Clyde, Jr.; Hurd, F. Kenneth; Hendrix, Warren P. and Corbett, William J., III, **An investigation into the growth of small aerosol particles with humidity change.** Georgia Institute of Technology. Engineering Experiment Station, Contract AF 19(604)-1086, Final Report, Dec. 31, **1956.** 88 p. 28 figs., 12 tables, 33 foot-refs., 32 eqs. **DWB**—NaCl, $CaCl_2$, AgI, PbI_2, KCl and $(NH_4)_2SO_4$ nuclei having a size range of 0.01–0.1 μ, were studied to determine their behavior under varying humidity conditions. Curves are presented showing that these hygroscopic components pick up some water at low relative humidity and that at a higher relative humidity the nuclei dissolve, becoming saturated droplets which grow with increasing relative humidity and decrease in size with decreasing relative humidity. Recrystallization occurs at a lower relative humidity than that at which the crystal dissolves. The smaller the nucleus, the lower the relative humidity at which it dissolves. Data are compared with theoretical curves. *Subject Headings:* **1. Hygroscopic nuclei 2. Nuclei growth rates 3. Humidity effects on nuclei.**—*M.R.*

8.7–23 551.582.1(57,471.1)

§*Putnins, P. and Zikeev, Nina (Stepanova), **Climate of the Eurasian Northlands.** (In: **Dynamic North.** Wash., D. C. Technical Assistant to the Chief of Naval Operations for Polar Projects, **1956.** Vol. 1, Pt. 4. Looseleaf. 104 p.) Contents: Putnins, P., **Dynamic and aerological climatology of the Eurasian Northlands,** p. 1–46. 17 figs., 7 tables (some fold.), 44 refs. Zikeev, Nina (Stepanova), **Surface climate of the Eurasian Northlands,** p. 45–93. 11 figs., 14 tables, 57 refs. Putnins, P., **Climatic changes in the Eurasian Northland,** p. 93–104. 2 figs., table, 27 refs. **DWB**—The essential features of the general circulation at the surface, and in the upper air over the Arctic Ocean and Eurasian Arctic (Siberia and Northern Russia and Finland), inversions, tropopause, winds, etc. are treated in detail, with accompanying charts and graphs, in the article by Putnins on dynamic climatology of Eurasian Northlands. In the article on surface climate of Eurasian Northlands, Mrs. Zikeev gives a very clear exposition of various features of the seasonal or monthly regime of insolation, temperature, cloud, fog, snow and snow cover, permafrost, and river ice. The discussion under each heading is arranged by season (winter and summer) or by region (Scandinavia, European Russia, Arctic, Western Siberia, Eastern Siberia and Chukotsk Peninsula). Much original illustrative and tabular material is included in the text, as well as a number of graphic isorithm charts for the area taken from the Great Soviet Atlas of the World, or from other sources. A good bibliography is appended. The article on climatic change by Putnins summarizes briefly the evidence for warming in the Arctic (as well as some evidence to the contrary, especially for the last decade). *Subject Headings:* **1. Climate of Eurasian Arctic 2. Climate of U.S.S.R. 3. Warming of Arctic 4. Siberia 5. Soviet Arctic 6. Scandinavia.**—*M.R.*

8.7–24 551.509.67:551.578.7(494)

*Switzerland. Eidg. Kommission zum Studium der Hagelbildung und Hagelabwehr, **Grossversuch II zur Bekämpfung des Hagels auf der Magadinoebene, 3. Versuchsjahr.** [Project 2 for Hail Control in the Magadino Plain, 3rd year of experimentation.] Its *Tätigkeitsbericht*, No. 8, 1955, pub. **1956.** 51 p. 17 figs., tables. **DWB**—In an arrangement similar to that of the reports on the 1st and 2nd seasons (*see* 6J–338, Oct. 1955, *MAB*), this report contains a detailed account of the third season of operation in the hail control experiments conducted

by the Swiss Commission for the Study of Hail Formation and Hail Prevention. The ten automatic ground-based silver iodide generators were distributed as before over the Magadino Plain (locations shown in map) and operated according to necessity during thunderstorms. Organization and operation of the seeding network, weather development and data on thunderstorms and hailstorms during the season (May 16–Oct. 10, 1955) and amounts of hail damage are discussed. For each instance of seeding a report of action is included, giving date, time of operation, generators in action, aerological data (including height of the −4°C isotherm), a map showing thunderstorm trajectories (classified as warm-front, cold-front or local thunderstorms) and miscellaneous comments. In summing up the results of the season the authors conclude that a statistical evaluation cannot be undertaken because this would require (no control area being available) a much longer series of operations than that obtained so far. Only qualitative conclusions may be drawn at this point. Out of the 69 days with thunderstorms, seeding took place on 37 days. Hail fell on 14 out of these 37 days in some part of the entire area of observation. In the seeding area (with or without seeding) there were ten days with hail. After eliminating thunderstorms with no hail, and hailstorms for which seeding was started too late, there remain four instances in which hail fell in the seeded area. In these cases the weather situation was such that the seeding agent is not likely to have reached the area of hail formation at the proper time. The same seeding network is to be used in the following season. *Subject Headings:* **1. Hail prevention in Switzerland 2. Cloud seeding with silver iodide 3. Magadino Plain, Switzerland. I. Sänger, R. II. Staub, H. III. Thams, J. C.**—*G.T.*

8.7–25 551.579.4

White, Gilbert Fowler, **Human adjustment to floods: a geographical approach to the flood problem of the United States.** Chicago, **1945.** Thesis (Ph.D.), Chicago Univ. 225 p. 8 figs., 13 tables, numerous foot-refs., bibliog., p. 213–225. **DLC** (TC423.W45). Reissued, 1954 as *Chicago University, Research Paper*, No. 29. Review by R. Keller in *Petermanns Geographische Mitteilungen*, Gotha, 100(2):146, **1956. DLC**—A wide range of historical, legal, economic, geographical and hydrological subject matter in connection with floods in the U. S. is treated in this thesis. Ch. 2 presents definitions of a number of terms connected with floods and flood events, discusses hydrographs used in flood forecasting; Ch. 3 gives statistics in flood losses in various parts of the U. S. for 1907–41 (histograms by region), and takes up losses in the various categories of damage (crop, land, roads, industry, commerce, psychological losses, etc.). *Subject Headings:* **1. Flood damage 2. United States.**—*M.R.*

MANUALS AND ATLASES

See also: **Pilot balloon manuals** (Tanatar), 8.7–12; **Fire weather observers handbook** (Hardy et al.), 8.7–104.

8.7–26 551.501.9(02)

Nezdiurov, Dmitriĭ Filippovich, **Inspektsiia meteorologicheskoĭ seti.** [Inspection of meteorological networks.] Leningrad, Gidrometizdat, **1955.** 315 p. 61 figs., 4 fold., 14 tables, 29 refs., eqs. **DLC** (QC875.N44)—A textbook or manual for students in training for technicians and administrators at meteorological centers, etc. The 26 chapters are divided into 4 main parts: I, Organization of meteorological stations and posts; II, Preparation for inspection of stations; III, Actual inspection of stations; IV, Final steps in completion of inspections. The history of networks, previous handbooks or guides for inspectors in Russia, current practices in U.S.S.R., setting up stations, photography of surroundings, etc., preparation for inspection trip, equipment needed, barometer comparisons, time and space determination, are treated in separate chapters. Then inspection of instruments, installation and observations for temperature, humidity, cloud, precipitation, snow cover, pressure, icing, visibility, wind pressure, soil temperature, sunshine, upper winds (pilot balloon), actinometers and agrometeorological equipment; public service activities, forms, archives, administration and, finally, technical details of leveling, photography, radio equipment, etc. are discussed. *Subject Heading:* **1. Network inspection manuals.**—*M.R.*

8.7–27 551.509.21

U. S. Air Weather Service, **Anomalies in the Northern Hemisphere, 700-mb 5-day-mean circulation patterns.** Its *Technical Report*, 105–100/1, April **1956.** 26 p. 14 figs., 2 tables, 10 refs. **DWB**—This manual gives instructions (with examples) for using the **Martin Anomaly Charts** in preparing prognostic charts for N. Hemisphere for 24 hrs or more for 500 or 700 mb level. The averaged selected charts, sign frequency charts, anomaly tendency charts, and their interpretation and use in 5-day mean and in 24–72 hr forecasting, are treated in separate chapters. The detailed charts are given in a separate publication, and the detailed instructions for 24–72 hr forecasting in *Air Weather Service, Technical Report*, 105–100/2 (*see item* 7.11–22, Nov. 1956, *MAB*). *Subject Headings:* **1. Martin anomaly charts 2. Northern Hemisphere anomaly charts 3. Extended forecasting from anomalies. I. Martin, D. E.**—*M.R.*

8.7–28 551.311.1

Evgenov, Nikolaĭ Ivanovich, **Al'bom ledovykh obrazovaniĭ na moriakh.** [Album of sea ice formations.] ed. by Iu. V. Preobrazhenskiĭ. Leningrad, Gidrometizdat, **1955.** 137 p. mostly photos (107), 4 charts. **DLC** (GB2595.E83)—About 150 ice terms are classified (using a detailed decimal system) according to various criteria, and defined. Over 100 half-page photographs illustrating most of these forms or occurrences (made in Arctic, Antarctic or Okhotsk Sea) are included in this attractive album. An alphabetical list of all of the terms used in the classification and album is appended as an index. *Subject Headings:* **1. Ice album 2. Sea ice terminology 3. Ice classifications 4. Arctic sea ice 5. Antarctic sea ice.**—*M.R.*

8.7–29 551.582.3:551.482:551.579.4(439.1)

*Hungary. Vízgazdálkodási Tudományos Kutató Intézet, **Magyarország hidrológiai atlasza, I. Sorozat, Folyóink vízgyüjtője.** [Hydrologic atlas of Hungary, Ser. 1, Drainage system of our rivers.] Budapest, 1954– Ser. 1, Vol. 4, **A Mosoni-Dunaág.** [Moson branch of the Danube.] pub. **1954.** 273 p. 11+ maps (fold.), biblio. p. 271–273. Ser. 1, Vol. 6, **A Kőrösök.** [The Körös rivers.] pub. **1956.** 279 p. 16+ maps in pocket, biblio. p. 274–279. Both almost entirely tables. **DLC** (GB726.H8B8)—The atlas includes (for each region) detailed maps of rivers, canals, and installations, as well as orographic maps, a map of forest cover, two on average annual precipitation and temperature (1901–1940), and one showing the location of hydrometeorological stations. The tables give exact specifications of all water courses and a list of all stations with indication of length of period (the longest dating back to 1894) for which observations are available on atmospheric pressure, temperature, soil temperature, humidity, evaporation, wind and sunshine duration. The basins covered in these two volumes (No. 4 and 6) are those in the extreme N. W. and extreme S. E. of Hungary, including parts of Austria and Romania. *Subject Headings:* **1. Climate of Hungary 2. Hydrological atlases 3. Hungary.**—*G.T.*

8.7–30 551.577.2(43)

*Germany. Deutscher Wetterdienst, **Mittlere Jahressummen des Niederschlags (mm) für das Gebiet der Bundesrepublik. Zeitraum 1891–1930, Masstab 1:200,000.** [Average year's sums of precipitation (mm) for the territory of the Federal Republic. Period of 1891–1910, scale 1:200,000.] Bad Kissingen, **1955.** looseleaf. 19″×27″ map, 45 charts.—Preparation of these large (1:200,000) isohyetal charts of mean annual precipitation was begun in 1948 under the direction of Karl Knoch. As shown in the reference chart (with topography as a background) the charts correspond on the whole to the areas used in topographic survey charts of West Germany. The interval varies from 25 mm in the lowlands to 200 mm in the alpine regions. Local effects such as that of altitude (in high mountains), exposure to prevailing winds (both for mountain slopes and islands on the North Sea Coast), urban influences (networks as a rule are not dense enough in cities to show urban influences in detail), and continental oceanic effects can be seen. Period of record was restricted to that published in **Klimakunde des Deutschen Reiches,** Vol. II, 1939 (1899–1930). This record agrees with 1891–1950 by ±5%. Notes on general climatic conditions as well as on preparation of charts are on text page. *Subject Headings:* **1. Precipitation atlases 2. Isohyetal charts 3. West Germany. I. Schirmer, Hans** (*ed.*) **II. Knoch, Karl.**—*M.R.*

8.7–31 551.463:535 551.593.1

Handbuch der Geophysik. Vol. 8, Lieferung 4. Berlin, Borntraeger, **1955.** Ed. by F. Linke (deceased) and F. Möller. tables, refs., eqs., diagrs. **DWB**—This section of the **Handbuch der Geophysik** contains two articles: Lauscher, F., **Sonnen- und Himmelsstrahlung im Meer und in Gewässern** [Solar and sky radiation in the sea and in bodies of water] and Meyer, R., **Atmosphärische Strahlenbrechung** [Atmospheric refraction], abstracted separately (*see* 6.11–214, Nov. 1955 and 7.1–335, Jan. 1956, *MAB*, respectively). (For abstract on Vol. 8, Pt. 1–3, *see* 5.10–2, Oct. 1954, *MAB*.) *Subject Headings:* **1. Optical properties of sea water 2. Atmospheric refraction. I. Linke, Franz** (*ed.*) **II. Möller, Fritz** (*ed.*).

8.7–32 551.5:629.13(02)

Johnston, Harvey, **Weather work.** Diagrams by Frank Rayfield. 2nd ed. Meteorological Div., Dept. of Transport of Canada, **1954.** looseleaf. sections variously paged· figs., photos., forms. Price: **$1.25. DWB** (M:629.13 C212W0)—This is a workbook to accompany his **Weather ways** (*see* 7.5–5, May, 1956, *MAB*) as a laboratory manual for students of aeronautical meteorology in Canada, and constitutes Pt. II of a revision of **A pilot's course in weather** by D. B. Kennedy, The work is divided into 5 parts: A) questions, exercises etc. to accompany 17 chapters of **Weather ways** (atmosphere, clouds, pressure, winds, moisture and temperature, stability, vertical motion, air masses, fronts, precipitation, fog, visibility, ice, thunderstorm and turbulence); B) comprises 6 flight planning exercises with actual synoptic examples; C) the Canadian Weather Service, reports, maps, forecasts, etc.; D) observing cloud forms, weather in Arctic, Atlantic, Pacific, United States and high levels; E) codes, forecast areas in Canada, etc. *Subject Headings:* **1. Aeronautical meteorology workbooks 2. Canadian Meteorological Service. I. Canada. Meteorological Div.**—*M.R.*

GENERAL GEOPHYSICS AND METEOROLOGY

IGY, WMO, UNESCO

See also: **Flood control, Asia-Far East** (U. N. Econ. Comm.), 8.7–295.

87.–33 551.590.25 550.3:523.5:061.3

Lovell, A. C. B. (*Jodrell Bank Experimental Station*), **Meteors and the International Geophysical Year.** (In: Kaiser, T. R., ed., **Meteors.** London, Pergamon Press, **1955.** p. 184–187. 10 refs.) **DWB**—A brief history of the IGY and 2 Polar Years is followed by a discussion of meteors and world days, and meteors and the ionosphere to show how meteor observations fit in with the program for world days and for the ionosphere, respectively. World days are specified for 2 days each month at new moon and one near quarter moon to coincide with major meteor showers. Four additional days with unusual meteoritic activity (June 30, July 30, Aug. 12 and Dec. 14, 1958) are added. Drifts in E region can be determined by following ionized meteor trails at Jodrell Bank. Also scale heights and densities in the 50–100 km region will be obtainable by use of the Super-Schmidt meteor camera. *Subject Headings:* **1. IGY meteor program 2. Meteor observation 3. Ionospheric drift.**—*M.R.*

8.7–34 550.3:061.3(84)

International Geophysical Year, 1957/1958. Comité Nacional de Bolivia, **Proyecto de labores del Comité Nacional de Bolivia.** [Project of activities of the National Bolivian Committee.] La Paz, May **1955.** 5 p. Mimeog. **DWB** (551.1 I61a)—Outline of projects for IGY, 1957/8 in: a) Meteorology (9 projects); b) Geomagnetism (7 projects); c) Ionosphere (2 projects); d) Solar radiation (2 projects); e) Cosmic rays (3 projects); f) Glaciology (2 projects); etc. Plan for cosmic ray research includes correlation of cosmic ray intensity with radio noise. Instrumental observations will be carried out at Chacaltaya Observatory, with equipment similar to that at Mt. Evans, Colorado. *Subject Headings:* **1. International Geophysical Year, 1957/1958 2. Cosmic ray research plans 3. Bolivian participation in IGY 4. Chacaltaya, Bolivia.**—*M.R.*

8.7–35 551.594.52:061.3

Chapman, Sydney, **The aurora in middle and low latitudes.** *Nature*, London, 179(4549): 7–11, Jan. 5, **1957.** 3 figs. Also issued in *Nature*, London, 179(4549):7–11, Jan. 5, 1957. 3 figs. Review by J. Paton in *World Meteorological Organization*, WMO Bulletin, 6(1):43–44, Jan. **1957. DWB**—Isochasms of Northern and Southern Hemisphere are shown and related to lines of geomagnetic latitude. Some auroras have been seen close to geomagnetic or geographical equator. Outstanding tropical auroras are listed, but the list is incomplete because observers did not realize the importance of the phenomenon. An appeal is made for tropical and subtropical observations during the IGY. An official World Prediction and Warning Center will be set up for "alert" and "special world intervals"; world-wide organization is necessary. Photos will be of great value. *Subject Headings:* **1. Auroral distribution 2. Low latitude auroras 3. International Geophysical Year aurora program.**—*C.E.P.B.*

8.7–36 551.590.24:551.593.7:551.594

Cialdea, R., **Les expéditions de l'I.N.G. pour les observations géophysiques pendant les éclipses totales du soleil.** [Expeditions of the National Institute of Geophysics of Italy for geophysical observation during the total eclipses of the sun.] *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings*, p. 556–558, London, Butterworth, **1956.** 3 figs. (photos), ref. **DWB**—The author discusses the observations on the polarization of light of the sky and on atmospheric electricity made at Khartoum during the eclipse of Feb. 25, 1952. *Subject Headings:* **1. Solar eclipse effects 2. Polarization 3. Atmospheric electricity.**—*I.L.D.*

8.7–37 551.5(26):061.3

Roll, H. U., **Die blaue Flagge der Vereinten Nationen wehte über dem Hamburger Hafen.** [The blue flag of the United Nations waves over Hamburg Harbor.] *Wetterlotse*, No. 109/10: 241–249, Dec. **1956.** table. **DLC**—On Oct. 16–31, 1956, the WMO Commission for Maritime Meteorology met at Hamburg. The work of the Commission is briefly described. Thanks of the WMO were expressed to the 12,000 Captains and Officers who voluntarily assisted in meteorological observations. H. Thomsen replaced C. E. N. Frankcom as President. *Subject Heading:* **1. WMO Maritime Meteorology Commission.**—*C.E.P.B.*

8.7–38 551.5:061.3(09)

Reichelderfer, F. W., **International cooperation in meteorology. Second Congress of the WMO, Geneva, April 14–May 13.** *U. S. Dept. of State, Bulletin*, 33(846):435–437, Sept. 12, **1955. DWB**—The U. S. Delegation to the Second Congress of the WMO, consisting of the author as head (and first Pres. of WMO) and 8 other administration or technical assistants, is listed, a brief history of the WMO is given, its purpose is defined, and its scope, finances, and the IGY activities in which WMO will participate are outlined. Budget for each of the next 4 years is $1,700,000, all told. Andre Viaut, director of the French Service, was elected President for the next 4 years. The Third Congress will be held in Geneva in 1959. *Subject Headings:* **1. WMO meetings 2. History of international meteorological organizations 3. Geneva, Switzerland.**—*M.R.*

ARCTIC RESEARCH

See also: **Climat. summary, Alert** (Canada. Met. Div.) 8.7–18; **Climate of Eurasian Northlands** (Putnins, Zikeev), 8.7–23; **Crevasse, N.W. Greenland** (Cook), 8.7–78; **Polar vortices** (Reed), 8.7–176; **Temp. inversions, Ice Island T3** (Belmont), 8.7–218; **Semidiurnal pressure variations, Arctic** (Haurwitz), 8.7–228.

8.7–39 551.5(98)

Rae, R. W. (*Canadian Army Operational Res. Estab.*), **Meteorological activities in the Canadian Arctic.** *Arctic*, Montreal, 7(3/4):119–128, **1954.** fig., table, 15 refs. **DLC**—In this concise account of the meteorological activities carried on in the Canadian Arctic by Canada jointly with the U. S., the author reviews the history of meteorological observations in the Canadian Arctic prior to 1946 and since that year when U. S.-Canadian operations were begun, the scope of the observations and their purpose, namely the working up of climatological

records; upper air observations, observations for air operations, ice fog studies and blowing snow and summarizes the research in Arctic meteorology being carried on in Canada; this covers atmospheric humidity, snowfall, permafrost, ice streams, ozone variation measurements and night sky radiation and auroras. A list of meteorological stations in the Canadian Arctic and a map showing their locations are presented. *Subject Headings:* **1. Arctic meteorological research 2. History of meteorological services 3. United States 4. Canada 5. Canadian Arctic.**—*I.L.D.*

8.7–40 551.501.9(987):551.311.184:629.13

Akkuratov, V., **Na dreĭfuiushchikh l'dakh.** [On drifting ice.] *Vokrug Sveta*, No. 8:9–13, Aug. **1954.** photos. **DLC**—After pointing out difficulties in finding an even and smooth ice field in the Arctic suitable for landing and take-off, and the establishment of a drifting meteorological and hydrological research station, the author describes the transportation, by airplanes and helicopters, of equipment and supplies for the drifting station "North Pole—4" in April 1954 on the ice field at 75°48′N and 175°25′W, a sturdy mass of ice suited for a long and steady drift. The article concludes with a description of an attack by a Polar bear on several members of the expedition and a visit (by airplane) to the station "North Pole—3." Illustrations show: the preparation of a hole in the ice for hydrological observations; the installation of a psychrometric booth and a tent over a hydrological winch, the landing of helicopters and an areal view of the station. *Subject Headings:* **1. Ice drift 2. Floating ice islands 3. Arctic weather stations 4. Arctic aircraft operations 5. Arctic.**—*A.M.P.*

8.7–41 551.501.9(268)

Morozov, S., **K poslednim paralleliam, I, Khoziaeva poliarnykh l'din.** [Towards the last parallels, Pt. 1, The masters of the polar ice.] *Ogonek, Moscow*, No. 31(1416):25–27, Aug. 1, **1954. Pt. 2, "Stolitsa vysokikh shirot."** [The capital of the high latitudes.] *Ibid.*, No. 32(1417):15–16, Aug. 8, **1954. Pt. 3, Nad khrebtom Lomonosova.** [Over the Lomonosov Ridge.] *Ibid.*, No. 33(1418):20–22, Aug. 15, **1954.** illus. (incl. photos). **DLC**—Report of a flight from Moscow to the center of the Soviet sector of the Arctic basin, of the landing on an ice field selected from the air by the pilot for the establishment of the drifting meteorological and hydrological station "North Pole 3." A map of the Arctic Basin shows locations and drift of the station from April to July 1954. Highest latitude reached was about 89°N. In Ch. 2 of the report the author describes further activities on the ice field, the arrival of the scientific personnel, equipment and supplies, the construction of prefabricated houses, tents and buildings for sheltering the scientific instruments and equipment, and the carrying out of observations and measurements, photographs showing these various activities are presented. A description of the members of the expedition and of observations (aerological soundings, measurements of water temperature and sea depths) made before the beginning of the actual drift of the ice field is given. In the third and last installment of the series the author describes one of the numerous "aerial leaps" from one ice field to another in order to investigate by means of bathymetric measurements the Lomonosov Ridge, a mountain chain on the bottom of the Arctic Ocean extending from the New Siberian Islands across the Polar region toward Greenland, and presents an outline of the history of its discovery and exploration. *Subject Headings:* **1. North Pole No. 3 2. Drift-ice meteorological stations 3. Soviet Arctic.**—*A.M.P.*

8.7–42 551.506.5(988) 551.509.21(988)

*Bouché, Michel and Taylor, Gérald, **Campagne au Groenland, 1948, Météorologie.** [Greenland field operations, 1948, Meteorology.] *Expéditions Polaires Françaises, Expédition Arctique, Publication*, No. 7:1–21, **1949.** figs., tables. Also: Rouet, Robert, **Campagne au Groenland, 1948, Transmissions radio.** [Greenland field operations, 1948, Radio operations.] *Ibid.*, p. 23–42. **DWB** (919.8 E96p)—Meteorological data obtained in continuous recordings (8 a.m. to 10 p.m.), surface observations (9 a.m., 12 noon, 6 and 9 p.m.) and pilot balloon soundings are tabulated. The station (camp No. 3) was in operation from July 14 to Aug. 26, **1948** on the Greenland ice cap near its edge (el.615 m). The data reflect a climate of transition

between the regime of the inner ice cap and that of the coastal areas. *Subject Headings:* **1. French Greenland Expedition 2. Synoptic reports 3. Greenland.**—*G.T.*

8.7–43 551.311.184(268)

Orvig, Svenn, **Floating ice islands in the Arctic Ocean.** *Geographical Review*, 43(2):277–279, April **1953. DLC** (G1.G35)—A review of existing knowledge of Arctic ice islands as gleaned from articles in *Arctic* (1952). In addition to the 3 well-known islands (T1, T2 and T3) about 56 others have been discovered since 1945 and several have been used for scientific bases or landing of aircraft. *Subject Headings:* **1. Arctic ice islands 2. Floating ice islands 3. Arctic.**—*M.R.*

ANTARCTIC RESEARCH

See also: **Katabatic winds, Antarctica** (Ball), 8.7–238; **Argentine investigations of Deception Island** (Feninger), 8.7–298; **Albedo of Antarctic snowfield** (Liljequist), 8G–166.

8.7–44 551.521.11 551.508.822

Borland, R., **Meteorological observations at Heard Island.** *Australian Meteorological Magazine*, Melbourne, No. 4:30–31, Aug. **1953. DWB**—Notes on sunshine variability on Heard Island, 750 successful successive radiosonde releases in 1952–53, in spite of high winds; pilot balloon releases and forecasting activities. *Subject Headings:* **1. Sunshine variability 2. Radiosonde release in high winds 3. Heard Island.**—*M.R.*

8.7–45 551.311.11(99)

Kosack, Hans-Peter, **Wie gross ist das Südpolargebiet?** [How big is the South Polar region?] *Petermanns Geographische Mitteilungen*, 94(4):202–206, **1950.** fig., 26 refs. **DLC**—After enumerating estimates of land areas with and without shelf-ice, author tabulates and charts areas by other definitions—extreme limits of icebergs, oceanic and atmospheric polar fronts, mean pack-ice limit and 10°C. isotherm of warmest month. *Subject Headings:* **1. Climatic zones 2. Polar ice 3. Antarctica.**—*C.E.P.B.*

8.7–46 550.38:551.521.64

Simpson, J. A., **Cosmic ray experiments derived from recent U. S. Antarctic expeditions.** *American Geophysical Union, Geophysical Monograph*, No. 1:107–116, **1956.** 13 figs., table, 16 refs., eqs. **DLC**—Cosmic-ray particles have been used as probes to investigate the distribution of the Earth's permanent magnetic field extending into the interplanetary space. The experiments were performed on the U.S.S. *Atka* and the U.S.S. *Arneb* during the two U. S. Antarctic Expeditions in 1954–55 and 1955–56, respectively. These results along with additional data show that this outer magnetic-field distribution is strikingly different from the surface of the Earth. Since the magnetic moment of the Earth's dipole field is inclined with respect to the axis of rotation, the cosmic-ray evidence suggests that the field distortion arises from the interaction of the magnetic field with a highly ionized interplanetary gas. These results also bear on the problem of defining geomagnetic coordinates for incoming charged particles. Preliminary results concerned with (a) the eccentricity of equivalent geomagnetic dipole fields, (b) the latitude effect of cosmic radiation in the Southern Hemisphere, and (c) the detection of solar flare produced cosmic-ray particles are also presented. *Subject Headings:* **1. Magnetic field 2. Cosmic radiation 3. Cosmic ray expeditions.**—*Author's abstract.*

8.7–47 910.4(99)

Sverdrup, Harold Ulrik, **Die Norwegisch-Britisch-Schwedische Expedition in die Antarktis.** [The Norwegian-British-Swedish-Antarctic Expedition.] *Polarforschung*, Ser. 3, 21(1):70–71, **1951. DWB**—Account of organization of expedition with base at "Maudheim" on floating ice in 71°3′S., 10°55′W. and voyage of relief ship. *Subject Headings:* **1. Polar expeditions 2. Antarctica.**—*C.E.P.B.*

OBSERVATORIES, INSTITUTIONS AND SERVICES

See also: **East Hill Radar Res. Station** (Harper), 8.5–48; **Polish State Inst. of Hydrol. and Met.** (Stenz), 8.7–51; **American Geophysical Union** (Dué Rojo), 8.7–59; **Oceanog. organization, Indo-Pacific** (Bruun), 8.7–63; **Met. services and all weather flying** (Reichelderfer), 8.7–88; **Agromet publ., Ger. Weather Serv.** (Schneider), 8.7–90; **Agromet. serv., W. Ger.** (Schnelle), 8.7–94.

8.7–48 551.501.8:061.6(426)

†Harper, W. G., **A survey of the facilities and research programme of the Radar Research Station.** *Great Britain. Meteorological Research Committee, M.R.P.*, 1009, 29 Oct. **1956.** 10 p. ref. Mimeo. **DWB**—Radar research at East Hill, near Dunstable, began when the Meteorological Office took over the station in 1947. Equipment for cloud and precipitation echoes, upper winds and sferics is described. Past work is summarized and 21 papers originating from East Hill are listed. Future plans are outlined, including use of 8 mm radar. An alternative site is being sought. *Subject Headings:* **1. Radar research stations 2. East Hill, Dunstable.**—*C.E.P.B.*

8.7–49 551.501.9:551.43

Bowen, Theodore (*Princeton Univ.*), **The world's highest mountain laboratory.** *Physics Today*, N. Y., 9(7):14–16, July **1956.** 4 photos. **DWB, DLC**—Photographs show the buildings on the Chacaltaya High-Altitude Laboratory, located at 5220 m (17,000 ft) above sea level near La Paz, Bolivia, and the Director Dr. Ismael Escobar V., who founded the observatory by starting a ski club, then installing cosmic ray and other geophysical equipment and then getting the government to make the place a national park, build a road and new buildings and finally, to "loan" them an unused power line that had served a mine before it was abandoned. Elaborate equipment furnished by MIT where Escobar studied in 1950–51, and the Univ. of Chicago, and support from the Univ. of La Paz and from Brazil, have added to the importance of this, the world's highest geophysical observatory. Acclimatization of personnel to La Paz (12,500 ft) for a week, allows 4 days at the Observatory each week before returning to La Paz. *Subject Headings:* **1. High altitude observatories 2. High altitude acclimatization 3. Chacaltaya High Altitude Laboratory, La Paz, Bolivia.**—*M.R.*

8.7–50 551.501.9:551.585.53(942)

Hungerford, T. A. C., **Desert meteorological station.** *Weather*, 12(2):55–57, Feb. **1957.** photo. **DWB**—Account of station at Maralinga, in northern South Australia, in the atomic testing range. *Subject Headings:* **1. Desert meteorological stations 2. Maralinga, South Australia.**—*C.E.P.B.*

8.7–51 551.5:06(438)

Stenz, Edward, **Rozwój fizyki atmosfery i meteorologii w pierwszym dziesięcioleciu Polski Ludowej.** [Progress of physics of the atmosphere and of meteorology in the first decade of the democratic Republic of Poland.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 7(1/2):11–17, **1954.** English summary p. 16. **DWB, DLC**—The reconstruction and modernization of Polish meteorology, its weather service, scientific and observational establishments, almost completely annihilated during the last war, are outlined and the successes achieved in this field are discussed. They are evidenced by the complete reestablishment of the meteorological network and service, the restoration of the State Hydrological and Meteorological Institute with a number of observatories, the organization of a series of Meteorological Institutes at the universities of Wrocław, Torun, Poznan and the Geophysical Institute at the University of Warsaw, the publication of many works, papers and manuals in the field of meteorology and physics of the atmosphere. Further development of meteorology was encouraged by the 1st Congress of Polish Science (1951), the creation in 1952 of the Academy of Sciences, the Committee on Geophysics and the founding of several periodicals dealing with geophysics and meteorology. *Subject Headings:* **1. Poland. State Institute of Hydrology and Meteorology 2. Atmospheric physics 3. Poland.**—*A.M.P.*

CONFERENCES AND SYMPOSIA

See: **Third Natl. Hydromet. Conf., Prague** (Hu), 8.7–2; **Second Conf. of WMO, Geneva** (Reichelderfer), 8.7–38; **Symposia on potato blight,** 8.7–137; **Smoke abatement conference,** 8.7–150.

EDUCATION, HISTORY AND BIOGRAPHY

BIOGRAPHY

See also: **Papers . . . dedicated to H. B. Bigelow,** 8.7–3.

8.7–52 551.5:92

Bilancini, Raoul, [**Obituary of**] **Augusto Schmauss.** *Rivista di Meteorologia Aeronautica*, Rome, 15(2):64, April/June **1955. DLC**—AUGUST SCHMAUSS (1877–1954) was professor of meteorology at the University of Monaco during most of his scientific career. Foremost among his numerous publications are **"Die Atmosphäre als Kolloid"** (written in cooperation with A. Wigand) and **"Das Problem der Wettervorhersage** (1929), which still command the interest of meteorologists throughout the world. He also did extensive work in the field of singularities. *Subject Headings:* **1. Obituaries 2. Schmauss, August.**—*G.T.*

8.7–53 551.5:92

Ramanathan, K. R., [**Obituary of**] **Professor Dr. Erich Regener.** *Indian Journal of Meteorology and Geophysics*, Delhi, 6(2):202, April **1955. DWB, DLC**—A sketch of REGENER's life, of his scientific contributions, of studies of ozone and of cosmic rays and a list of some of his collaborators and studies are presented. *Subject Headings:* **1. Obituaries 2. Regener, Erich.**—*I.L.D.*

8.7–54 92

Martin, Thomas, **Rumford: a bicentenary.** *Nature*, London, 171(4352):538–540, March 28, **1953. Rumford as a scientist.** *Ibid.*, p. 540–541. **DWB**—Born March 26, 1753 at Woburn, Mass. Experimented on calorimetry, radiant heat, conduction of heat by air, heat of friction etc., and designed new instruments, including photometer. Died 1814. *Subject Headings:* **1. Biography 2. Rumford, Count B. T.**—*C.E.P.B.*

8.7–55 551.5:92

Hawke, E. L. and R—, W. E., **Obituary notice of Mr. S. E. Ashmore, B.Sc., A.Inst.P.** *Royal Meteorological Society, Quarterly Journal*, 83(355):140, Jan. **1957.** Also: **Obituary** [**of**] **Mr. S. E. Ashmore, B.Sc., A.Inst.P., F.R.Met. Soc.** *Meteorological Magazine*, London, 86(1015):28–29, Jan. **1957. DWB**—Born Edmonton, London, Sept. 1, 1907, died Wrexham Oct. 14, 1956. Physics Master at Grove Park School, Wrexham, since 1937, and established a climatological station, school meteorological society, and mountain station on Bwlchgwyn (1267 ft.). He contributed many papers and notes to the **Quarterly Journal** and **Weather.** *Subject Headings:* **1. Obituaries 2. Ashmore, S. E.**—*C.E.P.B.*

BIBLIOGRAPHY

See also: **Papers . . . dedicated to H. B. Bigelow,** 8.7–3; **Dynamic met. and weather forecasting** (Godske et al.), 8.7–5; **Agromet. publications, German Met. Serv.** (Schneider), 8.7–90; special bibliography on **Albedo,** p. 949.

8.7–56 551.5:016:019.941(82)

Argentina. Servicio Meteorológico Nacional, **Selección de reseñas bibliográficas meteorológicas y geofísicas, 1954.** [Selection of bibliographic reviews in meteorology and geophysics, 1954.] Its [*Publicaciones*], *Ser. G*, 1954, pub. Dec. **1955.** 75 p. 343 abstracts. **DWB**—The best known meteorological periodicals, books and monographs published in 1953

and 1954 in the English, French, Italian, Spanish and to some extent the German speaking countries, which were received by the Argentine Meteorological Service Library in 1954, are analyzed, abstracted (in Spanish) and classified according to the U.D.C. scheme. About a dozen of the 343 items are plainly mis-classified or else placed in the wrong sequence—e.g. radio echoes from aurorae under atmospheric acoustics (No. 253), and under microclimatology in another instance (No. 218), and Geiger's **Climate Near the Ground,** under clouds (No. 185), etc. Otherwise the bibliography is excellent. (For 1952 and 1953 abstracts, *see* 6A–62 and 6.11–49, Jan. and Nov. 1955, *MAB.*) *Subject Headings:* **1. Meteorology abstracts 2. Bibliographies 3. Argentina.**—*M.R.*

8.7–57 551.5:016

†Giao, Antonio, **Bibliographie scientifique: physique théorique rélativiste et quantique; physique et météorologie phénoménologiques; météorologie dynamique, mécanique des fluides; analyses, comptes rendus, divers. Première Partie, Listes des publications 1925–1955.** [Scientific bibliography, theoretical, relativity and quantum physics; physics and meteorological phenomena; dynamic meteorology; fluid mechanics, pt. 1, List of publications, 1925–1955.] Lisbon, Tipografia Matematica, Otda., [**1955**]. 23 p. Chronological, by subject, and then by reprints and journals. *Subject Headings:* **1. Bibliographies 2. Dynamic meteorology.**

8.7–58 551.5:016(05)

†**Revista Brasileira de Geografia, Rio de Janeiro, Indice dos anos I a X, 1939–1948.** [Index, v. 1–10, 1939–1948.] pub. **1950.** 104 p. Alph. index by titles and by authors. Classed arrangement by type of article. Classed subject index (by title of article). **DWB** (MO5 159r)—In the subject index (p. 72–74) are about 125 references to articles or reviews on climate and weather which have appeared in the 10 volumes of the *Revista. Subject Headings:* **1. Periodical indexes 2. Bibliographies.**—*M.R.*

8.7–59 550.3:06

Dué Rojo, Antonio, **La Union Geofísica Americana.** [The American Geophysical Union.] *Revista de Geofisica*, Madrid, 14(56):411–415, Oct./Dec. **1955. DWB, DLC**—History of American Geophysical Union from 1916 when GEORGE ELLERY HALE, President of the National Research Council, created a Dept. of Geophysics, to date. The membership was 65 in 1922, 350 in 1932, 3,000 in 1946, and 5,000 in 1954, of whom 700 are from 71 foreign countries. The scope of the various sections (geodesy, seismology, meteorology, terrestrial magnetism and electricity, oceanography, vulcanology, hydrology, tectonics) and the work of the Union as a whole, its sources of revenue and publication are outlined. *Subject Heading:* **1. American Geophysical Union.**—*M.R.*

HISTORY

See also: **Chronology of weather sci.** (Okada), 8.7–11; **Met. activities, Canadian Arctic** (Rae), 8.7–39; **American Geophysical Union** (Dué Rojo), 8.7–59; **Early photographic obs. of spectrum of night glow** (Barber), 8.7–196.

8.7–60 551.583.2(820)

Brotherton, Bertram, **Weather in Shakespeare's plays.** *Weather*, 8(12):361–367, Dec. **1953. DWB**—Remarks on weather of 1564–1615 and quotations from the plays. *Subject Headings:* **1. Historical climates 2. Britain.**—*C.E.P.B.*

8.7–61 551.5(0)

Dufour, L., **Les écrivains et la météorologie: Gustave Flaubert.** [Writers and meteorology: Gustave Flaubert.] *Ciel et Terre*, Uccle, Belgium, 70(7/8):300–303, July/Aug. **1954. DLC**—A number of citations from FLAUBERT's work, his **"Bouvard et Pecuchet"** in particular, reveal him as a good observer of weather phenomena, interested in science. *Subject Headings:* **1. Meteorology in literature 2. Flaubert, G.**—*A.A.*

EDUCATION

See: **First book of weather** (Wyler), 8.7–14.

APPLIED METEOROLOGY

OCEANOGRAPHY AND MARINE METEOROLOGY

See also: **Papers in marine biol. and oceanog.,** 8.7–3; **Collected reprints from Chesapeake Bay Inst.** (Johns Hopkins), 8.7–4; **To the sea bottom in a bathyscaphe** (Piccard), 8.7–15; **Optical properties of sea water,** 8.7–31; **WMO. Maritime Met. Commission meeting, Hamburg** (Roll), 8.7–37; **"Stockholm"-"Andrea Doria" case** (Rodewald), 8.7–67; **Using shipping forecasts** (Blowers), 8.7–133; **Transmission of tide levels by radio, Elbe** (Klein), 8.7–138; **Sea temp. and wind regime** (Schweigger), 8.7–222; **Wind effect on depth of bays** (Nakano), 8.7–244.

8.7–62 551.46:91.04

Gagel, Ernst, **Die Sieben Meere: ihre Erforschung und Erschliessung.** [The seven seas: exploration and opening.] Brunswick, Georg Westermann Verlag, **1955.** 236 p. 105 figs., 24 plates, 18 tables, numerous refs. **DLC**—The geography, salinity, temperature, gaseous content, pressure, color, acoustics, optics, ice, waves, swell, tides, currents, fronts, biology and commerce of the seas or oceans are treated in a semitechnical fashion with excellent illustrations (photographs, charts and diagrams). The oceanographic expeditions of the "Challenger" (1872–6), the "Meteor" (1925–7, 1937–8), the "Albatross" (1947–8), the "Galathea" (1950–51), "Fram" (1893–6), "Sedov" (1937–40), "Papanin" (1937–8), T1, T2 and T3 are discussed and their routes shown on charts of the respective oceans. *Subject Headings:* **1. Oceanography 2. Oceanographic expeditions.**—*M.R.*

8.7–63 551.46:06

Bruun, Anton Fr., **An oceanographic organization for the Indo-Pacific region.** *Deep-Sea Research,* London, 2(1):84–86, Oct. **1954. DWB**—At the 8th Pacific Science Congress at Manila in Nov. 1953 an Indian Ocean-Pacific Organization for coordination of research in oceanography and fisheries was discussed and a resolution drawn up to outline the functions and objectives of such an organization, and to specify the budget and salaries of Director, Executive officer, etc. The success of the Permanent International Council for the Exploration of the Sea established in 1901–2 for the North Sea and Atlantic Region was given as an indication of the potential value of promotion of basic oceanographic research. The Indo-Pacific organization would cover physics, chemistry, geology, meteorology and biology of sea. *Subject Headings:* **1. Oceanographic research organizations 2. Indo-Pacific region.**—*M.R.*

8.7–64 551.46:91.04:576.8

Deacon, G. E. R. (*National Inst. of Oceanog., Wormley, England*), **Discovery investigations in the Southern Ocean.** *American Geophysical Union, Transactions,* 36(5):877–880, Oct. **1955** fig., ref. **DWB, DLC.** Also issued as *National Institute of Oceanography, Wormley, Collected Reprints,* 4(127), **1956. DWB**—The primary object of the investigations was to provide a scientific basis for the regulation of the whaling industry, and it included the pursuit of enquiries into the ecology, distribution and fluctuations of the plankton organisms which provide the whales with food. Most of the oceanographic survey has been done by the RRS *Discovery* II. which was specially built for the purpose and by the RRS *William Scoresby* designed for whale-marking and fishery work. Fourteen expeditions have been sent to the Antarctic Ocean over a period of 27 years, and unique experience and comprehensive results have been obtained. The physical and chemical data have been published in the Discovery Reports and increasing use is being made of them. The investigations are being continued under N. A. MACINTOSH at the National Institute of Oceanography. *Subject Headings:* **1. Oceanographic expeditions 2. Plankton 3. Antarctic seas.**—*Author's abstract.*

8.7–65 551.5:551.46

Deacon, G. E. R.; Sverdrup, H. U.; Stommel, Henry and Thornthwaite, C. W., **Discussions on the relationships between meteorology and oceanography.** *Journal of Marine Research*, New Haven, Conn., 14(4):499–515, **1955.** 3 figs., table, 4 refs., 6 eqs. **DWB, DLC.** Also issued as *National Institute of Oceanography, Wormley, Collected Reprints*, 4(126), **1956. DWB**—The authors discuss the essential unity of oceanography and meteorology in theoretical approach for the problem of circulation energy transport in the world ocean and in the atmosphere, potential evapotranspiration as a tool in the study of the water content of the oceans, establishment of permanent oceanographic stations, an analysis of CHARNEY's discussion of quasigeostrophic flow, etc. *Subject Headings:* **1. Oceanic circulation 2. Potential evapotranspiration.**—*I.L.D.*

8.7–66 532.593:551.465

DeLeonibus, Pasquale S. (*U. S. Hydrographic Office, Wash., D. C.*), **Climatological data on the generation and propagation of waves in the North Atlantic.** New York Univ. Dept. of Meteorology and Oceanography, Contract Nonr-285(03), [1955]. p. 111–128 (Ch. 10 of unidentified monograph), 5 figs., 5 tables, 10 refs. **DWB**—A moderate gale fetch is defined as an area where winds of force 7(28–33 kn) or higher blow for at least 24 hrs. Data obtained from Northern Hemisphere Synoptic Charts were used to calculate length, breadth, frequency and location of such fetches in the North Atlantic in each of the winter months, Oct.-March. The resulting data are analyzed for seasonal regional variations and their relation to actual wind and wave data published in pilot charts and atlases. Fresh gale and strong gale (force 8 and 9) fetches are also analyzed. Area in Mid-Atlantic where fetches are most frequent is also area of greatest frequency of gales and high seas. This area is at lat. 52°, long. 37°W in Nov. and moves south to lat. 47°N, long. 42°W in March. Propagation of swell from these areas is also treated. *Subject Headings:* **1. Ocean swell forecasting 2. Ocean swell frequency 3. Gale frequency 4. Fetch 5. North Atlantic.**—*M.R.*

8.7–67 551.5:656.61

Rodewald, M., **Folgerungen aus dem Fall "Stockholm"-"Andrea Doria."** [Conclusions of the "Stockholm"-"Andrea Doria" case.] *Wetterlotse*, No. 114/115:63–70, March **1957.** Also: Backhausen, F., **Wetternavigation—oder Zwangswege?** [Weather navigation—or a fixed route?] *Ibid.*, p. 71–74, fig. **DLC**—Strict navigation and radar should have enabled the collision between "Stockholm" and "Andrea Doria" to have been avoided. Fixed lanes are discussed; climatic conditions, i.e. ice and fog on Newfoundland Banks, are taken into account; it is illogical not to consider day-to-day weather conditions. Application of radar should be improved. BACKHAUSEN discusses further the question of fixed routes. *Subject Heading:* **1. Marine navigation.**—*C.E.P.B.*

8.7–68 621.396.9

Schooley, Allen H., **Some limiting cases of radar sea clutter noise.** *Institute of Radio Engineers, N. Y., Proceedings*, 44(8):1043–1047, Aug. **1956.** 6 figs., 13 eqs. **DLC**—Radar return from the rough surface of the wind disturbed sea is a source of noise that affects the over-all signal-to-noise ratio of radars operating over water. This paper presents the results of an analysis showing some limiting values of the effective radar scattering area per unit area of the sea surface ($\sigma°$) vs radar depression angle (θ) for perfectly smooth and perfectly rough surfaces. Available experimental data are shown to be consistent with the theoretical limits. *Subject Heading:* **1. Radar echoes from sea.**—*Author's abstract.*

8.7–69 551.556:551.46:532.593

Shuleĭkin, V. V., **Dinamika vetrovykh voln i mertvoĭ zybi.** [Dynamics of wind waves and ground swells.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaia*, No. 5:451–480, **1954.** 12 figs., 7 refs., 87 eqs. **DLC**—The author gives an extensive theory of the increase of wave height and length with increasing wind speed. It is based on new experimental data. Derivation of equations and compilation of diagrams is explained in detail. The origin of

swell is also theoretically treated. A general formula is given for computation of energy conveyed by wind to a unit of sea surface: $W_v = Ar_0(V-C)^2$, where W—amount of energy, θ—kinematic viscosity, A—constant coefficient, r—radius of the orb of a surface particle, V—wind speed, C—wave phase speed. Kinematic viscosity was determined and proof was found that this viscosity is of turbulent origin. *Subject Headings:* **1. Wind waves 2. Wave heights 3. Swell.**—*N. S. Zikeev.*

8.7–70 551.556:532.593:551.468

Shuleĭkin, V. V., **Razvitie vetrovykh voln na melkovodnom more.** [Development of wind waves in a shallow sea.] *Akademiia Nauk SSSR, Doklady*, 104(2):215–218, **1955.** 2 figs., 3 refs., 12 eqs. **DLC**—The fundamental difference between the behavior of waves in deep and shallow seas and the development of waves is studied under conditions such that the ratio of depth of the sea to the length of the waves is small. The relationship determining the life of a wave in shallow water acquires a simple form same as $\alpha = 2\pi \frac{H}{\sigma}$ approaches zero, $\frac{sh\ 2\alpha}{\alpha}$ approaches 2. Equations are developed giving the force expended by a wave in shallow water, the energy balance of waves in shallow water from the energy imparted by the wind and that consumed by internal turbulence, the amplitude of waves in shallow water reaching a given distance from the windward shore, etc. The experimentally determined hyperbolic curves are analyzed on the basis of theoretical equations. *Subject Headings:* **1. Wind waves 2. Shallow water waves.**—*I.L.D.*

8.7–71 532.59:551.46:551.556

Shuleĭkin, V. V., **Sovremennaia teoriia morskikh voln.** [Contemporary theory of sea waves.] *Priroda*, Moscow, 44(19):29–40, Oct. **1955.** 17 figs. (incl. photos). **DLC**—The author reviews contemporary wave theory based upon experimental studies, in which waves are produced by winds of unlimited duration so that the damping of swells after cessation of wind action can be investigated, and on theoretical studies of the trajectories of individual water particles and the forces acting upon them. Experimental techniques for studying artificial waves are described with the aid of photographs, and the movement of particles in swells, the trajectory of particles in wind waves, the development and extinction of waves, the development of stable swells, the growth of waves with increasing distance from the shoreline, etc. are analyzed theoretically and experimentally with the aid of graphs. *Subject Headings:* **1. Sea wave theory 2. Wind waves 3. Swell.**—*I.L.D.*

8.7–72 551.556:532.593:551.468

Shuleĭkin, V. V., **Uravneniia polia vetrovykh voln na melkovod'e.** [Equations of wind fields of waves in shallow waters.] *Akademiia Nauk SSSR, Doklady*, 104(3):397–400, **1955.** 2 figs., ref., 9 eqs. **DLC**—The author examines the general case of development of wind waves at any given distance from a windward shore. The equation developed is:

$$\frac{\partial \eta}{\partial \tau} = 1 - \beta_\eta - \gamma\eta^1 - \eta^{\frac{1}{2}} \frac{\partial \eta}{\partial \epsilon}$$

where ϵ, τ and the dimensionless functions η are substituted for x, t and their function γ (amplitude of wave) in the equation for energy balance (developed in *Akad. Nauk SSSR, Doklady*, 104(2), 1955; *see* 8.7–70, above). The solution of the equation for any general case is outlined. *Subject Headings:* **1. Shallow water waves 2. Wind wave equations.**—*I.L.D.*

8.7–73 535.37(26)

Phosphorescent wheels [in] Persian Gulf [and] Phosphorescence [in] French West African waters [and] Persian Gulf [and] Macassar Straits [and] Sudden uprising of fish and phosphorescence in the Arabian Sea. *Marine Observer*, 27(176):90–94, April **1957.** **DLC**—Accounts of a number of observations, with editorial comments in some cases. *Subject Heading:* **1. Phosphorescence.**—*C.E.P.B.*

GLACIER ICE AND SEA ICE

See also: **Album of sea ice formations** (Evgenov), 8.7–28; **Drifting ice** (Akkuratov), 8.7–40; **Floating ice islands, Arctic** (Orvig), 8.7–43; **Pack ice boundary, Labrador-Greenland** (Rodewald), 8.7–121; **Temp. inversions, Ice Island T-3** (Belmont) 8.7–218; **Snow and avalanche research, Czechoslovakia** (Vrba, Urbánek), 8.7–288; **Nisqually Glacier** (Harrison), 8.7–305; **Glacial activity, Western U. S.** (Johnson), 8.7–306; **Glacier obs., Spitsbergen** (Mellor), 8.7–307.

8.7–74 551.311.12:001.4

Court, Arnold, and others, **The classification of glaciers.** *Journal of Glaciology*, 3(21):2–7, March **1957.** 11 refs. **DWB**—A letter from COURT to a number of glaciologists is printed. This proposes a classification of glaciers according to their thermal properties: *permelting*, permeated by melt water, at least in summer; *refreezing* of melt water from an upper layer; *nonmelting* (no surface melting). V. SCHYTT favored an improved classification based on AHLMANN's of 1935 (temperate, sub-polar, high-polar) and most of the other correspondents supported this view. The Editor called attention to a 5-fold classification by G. A. AVSIUK (*Akad. Nauk SSSR, Izvestiia, Ser. Geograf.*, No. 1:14–31, 1955). An English translation is given. *Subject Headings:* **1. Glacier classification. I. Schytt, V. II. Avsiuk, G. A.**—*C.E.P.B.*

8.7–75 551.311.12(798)

Muller, E. H. and Coulter, H. W., **Incipient glacier development within Katmai caldera, Alaska.** *Journal of Glaciology*, 3(21):13–16, March **1957.** 4 figs., 7 refs. English and German summaries p. 13. **DWB**—Summit of Mt. Katmai was destroyed by eruption of 1912, forming a deep caldera, occupied in 1953 by a lake which residual heat keeps unfrozen even in winter. Small glaciers have formed. *Subject Headings:* **1. Glacier formation 2. Mt. Katmai, Alaska.** —*C.E.P.B.*

8.7–76 551.311.12

Weertman, J., **On the sliding of glaciers.** *Journal of Glaciology*, 3(21):33–38, March **1957.** 3 figs., 9 refs., 5 eqs. English and French summaries p. 33. **DWB**—Sliding of a glacier over a rough surface is attributed to pressure melting combined with creep rate enhancement through stress concentrations. These terms are examined and an equation developed for sliding velocity involving size and distance apart of roughnesses, shear stress and a number of constants. *Subject Heading:* **1. Glacial movement.**—*C.E.P.B.*

8.7–77 551.311.15:551.583.2(987)

Thompson, H. R., **The old moraines of Pangnirtung Pass, Baffin Island.** *Journal of Glaciology*, 3(21):42–49, March **1957.** 6 figs., 16 refs. English and German summaries p. 42. **DWB**—The origin of the old moraines is discussed. They were probably deposited by trunk glaciers and have ice cores which are now melting. Disappearance of the glaciers is placed about 500 A.D. *Subject Headings:* **1. Glacier variations 2. Baffin Island.**—*C.E.P.B.*

8.7–78 551.311.17(988)

Cook, John C., **Some observations in a Northwest Greenland crevasse.** *American Geophysical Union, Transactions*, 37(6):715–718, Dec. **1956.** 2 figs., ref. **DWB, DLC**—A crevasse believed to be of average size, located in the coastal belt of the northwest Greenland icecap, has been studied. In 1955, it was at least 300 m long and 15 m deep. At its widest point it was 3 m broad, becoming narrower at the ends, top, and bottom. It was strongly bridged by snow, firn, glazing, and porous masses of vapor crystals. Ice shelves and wide cracks in the ceiling and floor which were observed may indicate at least three periods of widening, separated by one or more seasons of surface drift-bridging and bottom-water freezing. The bottom-water level depended upon an equilibrium between supply and drainage, which fluctuated with weather. No other changes were noted during two months of observations. Some interesting analogies between this crevasse and a natural limestone cave have been noted. *Subject Headings:* **1. Crevasses 2. Greenland Ice Cap.**—*Author's abstract.*

8.7–79 551.311.18(261)

Rodewald, M., **Verfrühung der nordatlantischen Eis-Saison 1957.** [Earlier North Atlantic ice season 1957.] *Wetterlotse*, No. 114/115:75-79, March **1957.** 2 figs. **DLC**—Greenland ice season began 4 months earlier than usual. This is explained by the mean pressure distribution, which in Oct.–Dec. 1956 and Jan.–Feb. 1957 was 2 mb above normal over Labrador and Newfoundland and 6 mb below normal over SE Greenland, leading to abnormally cold conditions over Belle Isle Strait and stronger ice drift. Conditions in 1912 (wreck of *Titanic* April 14) were similar. *Subject Headings:* **1. Sea ice variations 2. North Atlantic.**—*C.E.P.B.*

GEOMAGNETISM

See: **F2 layer ionization and magnetic dip** (Bhar), 8.7–154; **Magnetic effects on ionosphere** (Shinn), 8.7–162; **Geomag. obs. during solar eclipses** (Volland), 8.7–164; **Geomag. effects on cosmic ray focusing** (Åström), 8.7–204.

ASTRONAUTICS—SATELLITE OBSERVATORIES

See also: **Geophys. res. with artificial satellites** (Singer), 8.7–119.

8.7–80 550.3:061.3:629.19

Miczaika, G. R., **Das Internationale Geophysikalische Jahr, IV, "Projekt Vanguard." Der künstliche Erdsatellit und seine Bahn.** [The IGY, Pt. 4, Project Vanguard: the artificial satellite and its path.] *Umschau*, 57(7):193–195, April 1, **1957.** 5 figs. **DLC**—Properties of the atmosphere at a height of 500 km are summarized; improved data may be obtained with a satellite. Life has been variously calculated as a few days to a year. Launching mechanism and elliptical track are briefly described. *Subject Headings:* **1. Satellite observatories 2. IGY program.**—*C.E.P.B.*

8.7–81 551.5:629.19

Faust, Heinrich, **Die Bedeutung des künstlichen Erdsatelliten für die Meteorologie.** [The importance of the artificial satellite for meteorology.] *Naturwissenschaftliche Rundschau*, 10(4):137–141, April **1957. DWB**—Artificial satellites will enable the atmosphere to be studied from above. First exact measurements of solar radiation and earth's albedo will be possible; the elliptical orbit and spiral descent will give information for different heights. Density and composition can be inferred, especially loss of water vapor to space. Variations of UV radiation are important for both short and long-range forecasting. Cloud distribution can be photographed by television cameras and new depressions recognized in areas with few stations. A regular satellite would save much money and might even prove a good capital investment. *Subject Heading:* **1. Satellite observatories.**—*C.E.P.B.*

8.7–82 551.5:533.6

Friedrich, Hans R. (*Univ. of Calif. at L. A.*) and Dore, Frank J. (*Gen. Dynamics Corp.*), **The dynamic motion of a missile descending through the atmosphere.** *Journal of the Aeronautical Sciences*, N. Y., 22(9):628–632, 638, Sept. **1955.** 2 figs., 2 refs., 57 eqs. **DWB, DLC**—Equations of motion are separated into a set of "static" and "rotational" equations, the latter describing oscillatory motions of a missile. Atmospheric conditions such as air density and temperature, lateral winds and wind gusts can be only partially accounted for. *Subject Headings:* **1. Aerodynamics 2. Equations of motion 3. Missile flight.**—*A.A.*

8.7–83 629.19:530.12

Singer, S. Fred (*Maryland. Univ. Physics Dept.*), **The application of an artificial satellite to the measurement of the general relativistic "red shift."** *Maryland. Univ. Physics Dept., Technical Report*, No. 31, March **1956.** 5 p. 2 figs., 6 foot-refs. 8+5 eqs. in appendices. **DWB**—In view of the paucity of experimental tests for the general theory of relativity it is desirable to consider the uses a satellite vehicle could be put to. The advance of the perigee is calculated analogous to the perihelion advance of Mercury; it amounts to only 15″ per year. However, the effect on a satellite clock is large and could be measured. With respect to an earth clock it is calculated to be a "red shift" for low altitude orbits, zero shift

for an orbit at one-half the earth's radius, and a "violet shift" for higher altitudes, where it approaches 7×10^{-10}. Some experimental schemes for the measurement of the clock shift are discussed; a counting technique seems to be best suited since it is capable of higher ultimate accuracy and avoids signalling problems during intercomparison arising from the motion of the satellite. *Subject Headings:* **1. Satellite observatories 2. Relativity tests.**—*Author's abstract.*

8.7–84 629.19:521.3:551.510.3:551.510.536

Singer, S. Fred, **Studies of a minimum orbital unmanned satelllite of the earth (MOUSE), Pt. 2, Orbits and lifetimes of minimum satellites.** N. Y. American Rocket Society, **1954.** 21 p. 16 figs., 3 refs., 43 eqs. Mimeo. "Presented at the 9th Annual meeting of the American Rocket Society, N. Y., Nov. 30–Dec. 3, **1954.**" "Pt. 3 to appear later." **DWB**—The purpose of this paper is two-fold: (1) To describe the (elliptical) orbit of an artifical satellite in terms of the launching conditions (i.e. at "burnout"); in particular, to give perigee (minimum) and apogee (maximum) altitudes of the ellipse as a function of launching altitudes and of errors in launching velocity and angle. Criteria are then developed for controlling the launching conditions. (2) To investigate the subsequent behavior of the orbit under the influence of the drag of the upper atmosphere. The "lifetime" of the satellite depends on its area and mass, and is related to the upper atmosphere densities: hence these densities can be determined from measured changes of the orbit by methods discussed in detail. Both circular and elliptic orbits are investigated using appropriate approximation methods. The appendices take up (a) some features of orbit theory and (b) upper atmosphere densities. (For Pt. 1, *see* 7.11–123, Nov. 1956, *MAB*.) *Subject Headings:* **1. Artificial satellite orbits 2. Density gradient in upper atmospher 3. Project MOUSE.**—*Author's abstract.*

AERONAUTICAL METEOROLOGY

See also: **Weather work** (Johnston), 8.7–32; **Weather avoidance with airborne radar** (Stride), 8.7–114; **Airplane turbulence observation** (Bullen), 8.7–231.

8.7–85 551.509.25:629.13

*Corwin, H. G. (*TWA, Los Angeles*), **Flight planning based on prognostic charts.** Trans World Airlines, Meteorology Dept., Jan. **1953.** 10 p. 9 tables, 2 figs., eqs. Mimeo. **DWB**—Method developed for the planning of long range aircraft operations outside of tropical areas, utilizing observed and prognostic pressure contour maps. The geostrophic tailwind component can be derived directly from the cross course height gradient by means of a template. Corrections for losses due to drift are discussed. As an example, the application to flight routes between California and Chicago is analyzed. *Subject Headings:* **1. Aeronautical meteorology 2. Flight planning 3. Prognostic charts 4. California-Chicago air routes.**—*A.A.*

8.7–86 551.55:527:629.13

Grocott, D. F. H.; Proctor, J. D. and Palmer, E., **The accuracy of dead reckoning in the air.** *Institute of Navigation, London, Journal*, 9(2):224–229, April **1956. DWB**—Discussion of C. S. Durst, **The accuracy of dead reckoning in the air,** and J. B. Parker, **The navigational implications of Mr. Durst's paper** (*Inst. of Navigation, Journal*, 8(2):91–113, 113–116, April 1955; *see* 6.8–72, Aug. 1955, *MAB*). The points raised deal mainly with practical navigation in the air, including the use of wind forecasts. The data used by Durst and Parker are criticized. Durst and Parker comment. *Subject Headings:* **1. Aerial navigation. I. Durst, C. S. II. Parker, J. B.**—*C.E.P.B.*

8.7–87 656.7:629.13

Nivet, R., **Frêt et altitude.** [Freight and altitude.] *La Météorologie*, Paris, 4th Ser., No. 30:144–149, April/June **1953.** French, English and Italian summaries p. 144. **DWB**—Careful packaging and air conditioning are necessary for air freight if perishables are involved. Practical rules for certain types of products are given. Refrigeration as well as heating are often necessary. Air France has its own regulations. *Subject Headings:* **1. Air transport of perishables 2. Air freight 3. France.**—*M.R.*

8.7–88 551.5:629.13:061

Reichelderfer, Francis W. (*U. S. W. B., Wash., D. C.*), **Meteorological services and bad weather flying.** *Interavia*, Geneva, 9(4):220–223, **1954.** port., fig. **DWB**—Technological improvements in aircraft and navigation aids have decreased the hazards due to weather but increased the demand for meteorological service. For instance, winds and temperatures are required to higher levels and over greater distances, flying in clouds has produced a demand for more detailed information regarding cloud bases, tops, turbulence, icing, etc. Six factors that have produced this paradox are: 1) tremendous increase in amount of flying; 2) increase in range of planes and hence in geographical area to be covered by charts, forecasts and reports, also denser network of airports demanding service; 3) trend toward all-weather flying; 4) increase in night, Sunday and holiday flying; 5) greater vertical range; and 6) greater variety of aircraft not all of which have all-weather equipment. *Subject Headings:* **1. All weather flying 2. Aeronautical meteorological service trends.**—*M.R.*

8.7–89 551.5:629.13

§*United Air Lines, Inc., **Weather patterns at East Coast terminals of United Air Lines.** Its *UAL Meteorology Circular*, No. 38, Sept. 20, **1954.** 67 p. numerous charts, tables, diagrs. **DWB**—Detailed graphical presentation of essential terminal weather data for 10 cities in the Eastern United States (Allentown, Baltimore, Boston, Hartford, Idlewild, La Guardia, Newark, Philadelphia, Providence, Washington, D.C.) plus local forecast hints for New York area, Chesapeake Bay area and Southern New England area, and a score or more typical weather maps for different months or seasons. The well analyzed surface synoptic charts are accompanied by concise summaries of pertinent conditions attending each. *Subject Headings:* **1. Airport climatic data 2. Local weather studies 3. Synoptic case histories 4. Airways forecasting 5. East Coast, United States.**—*M.R.*

AGRICULTURAL METEOROLOGY

See also: **Climate of cultivated fields** (Rusin), 8.7-16; **Land use and agro-geog. structure, Bitburg** (Barners), 8.7–17; **Apple blossom phenology and winter temp., Rio Negro Valley** (Ruggiero), 8.7–118; **Potato blight forecasting,** 8.7–137; **Forecasting flowering date** (Van der Bijl), 8.7–210; **Geog. and agric. sketch of Morocco** (Grillot), 8.7–312; **Agromet. res., Morocco** (Vernet), 8.7–313; **Temp. effects on fruit yield, Vienna** (Steinbach), 8.7–314.

8.7–90 551.5:63:016

†Schneider, Max, **Veröffenlichungen agrarmeteorologischen Inhalts von Angehörigen des Deutschen Wetterdienstes in der Zeit vom 1.1.1946–30.6.1955.** [Agro-meteorological publications of the staff of the German Weather Service from Jan. 1, 1946–June 30, 1955.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(14):192–209, **1955. DWB**—The list of publications is subdivided into the following classes: textbooks, local micro and stand climate, soil climate, heat and moisture content of soil, soil and microclimatic amelioration, phenology, agricultural climatology, agricultural planning; plant physiology, weather, crop yield and quantity of harvest, rick storage and cellar climate, greenhouse climate, irrigation, dew and other atmospheric condensation, wind damage, wind protection, frost forecasting, frost, frost damage and frost protection, droughts, floods, hail, smoke damage, climate, weather and animals, techniques, bibliographies, etc. *Subject Headings:* **1. Agrometeorological publications 2. West German Weather Service.**—*I.L.D.*

8.7–91 621.6(46)

Quelle, Otto, **Beiträge zur Kenntnis der Agrargeographie des Ebrobeckens.** [Contributions to the knowledge of the agricultural geography of the Ebro basin.] *Die Erde*, No. 1:30–38, **1954.** 2 figs., refs. **DLC**—The inner basin is dry, with rainy mountains to north and south. The paper describes plans for irrigation, available water and drought risks. *Subject Headings:* **1. Irrigation 2. Ebro River basin, Spain.**—*C.E.P.B.*

8.7–92 632.7(26)

Rodewald, Martin, **Kampf den Heuschrecken! Schiffe können mithelfen.** [Fight against locusts. Ships can help.] *Wetterlotse*, No. 76:195–197, Sept. **1954. DWB**—Many locust swarms cross Red Sea, Gulf of Aden, Persian Gulf and Arabian Sea. Ships' officers should report such swarms by radio to DESLOC, Nairobi. *Subject Heading:* **1. Locust control**—*C.E.P.B.*

8.7–93 551.58:63 551.582.2(438)

*Roguski, Wacław, **Charakterystyka klimatu lokalnego pradoliny Wisły na zachód od Bydgoszczy z punktu widzenia potrzeb rolnictwa.** [Characteristic of the local climate in the old Valley of the Vistula, West of Bydgoszcz, from the agricultural point of view.] *Przegląd Geograficzny*, Warsaw, 26(4):146–154, **1954.** 2 figs., 3 tables, 4 refs. Russian and English summaries p. 152–154. **DWB, DLC**—Data obtained during growing season of 1952 and 1953 at the Agricultural Experiment Station at Minikowo in the Vistula Valley west of Bydgoszcz are used to show differences in climate between a valley and a table land 40 m above the valley bottom. Minimum surface and air temperatures are lower in the valley by 2° to 13°C than on the table land during the growing season. Maximum temperatures and precipitation amounts were nearly the same. Humidity was higher and evaporation lower in the valley. From June 30 to Aug. 20, 1953 evaporation was 61% of that on the table land. Plants subject to freezing should not be planted before May (last frosts average May 8–15), nor too late because of autumn frosts. Data from other locations should not be extrapolated without due care. *Subject Headings:* **1. Agricultural climatology 2. Local climates 3. Minikowo Agricultural Experiment Station 4. Minikowo, Poland.**—*M.R.*

8.7–94 551.5:63

Schnelle, Fritz, **Entwicklungslinien der Agrarmeteorologie.** [Developmental trends of agrometeorology.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(14):110–124, **1955.** 2 figs. **DWB**—The author gives a brief history of the German agricultural meteorological service since 1934 when it became part of the German meteorological service, describes the organization and function of the agro-meteorological service which includes agrometeorological observations, statistical and experimental research, consultation, etc. In discussion on tendencies of future developments in agro-meteorology, the author considers the increase in agricultural meteorological consultation, the fundamental fields and limits of agrometeorological research, developmental tendencies in phenology, requirements of radiation observation by agrometeorologists, terrain climate investigations, frost protection, plant protection, agricultural meteorology in universities and technical schools and international aspects of agricultural meteorology. *Subject Headings:* **1. Agricultural meteorology 2. Agrometeorological services 3. Progress in agricultural meteorology.**—*I.L.D.*

8.7–95 633.2:551.509.58

Williamson, E. A., **Weather situations favourable for haymaking in the Bay of Plenty District.** *New Zealand. Meteorological Service, Technical Note*, No. 97, Feb. 25, **1953.** 3 p. chart. **DWB**—Criteria based on the locations of anticyclones are developed for the identification of situations favorable for the occurrence of 4-day spells free or almost free of rain in the Bay of Plenty district during the haymaking season, Nov. to Feb. inclusive. *Subject Headings:* **1. Agrometeorological forecasts 2. Synoptic climatology 3. Objective fair weather forecasting 4. Haymaking weather 5. Bay of Plenty, New Zealand.**—*Author's abstract.*

SOILS

See also: **Ground frost as a . . . natural phenomenon** (Schmid), 8.7–215; **Frost effects on soil** (Schmid), 8.7–216; **Soil climate, European U.S.S.R.** (Shul'gin), 8.7–220; **Variation in sub-soil temps.** (Singer, Brown), 8.7–221; **Soil moisture measurement** (Danilin), 8.7–296; **Soil moisture retention** (Richards), 8.7–297.

8.7–96 551.58:631.42

Ganssen, Robert, **Neuere Gedanken über die Gesetze der Bodenbildung.** [New ideas on the laws of soil formation.] *Naturwissenschaftliche Rundschau*, 10(3):96–98, March **1957.**

6 refs. **DWB**—Different climatic regions have different colored soils. This is seen in wide regions of uniform relief, such as E. Europe. In Central Europe, rocks, relief, vegetation, ground water and time influence soil; rock formation especially may outweigh climate. Soils become more acid with increasing height. Finally, agriculture plays a large part. *Subject Headings:* **1. Soil structure 2. Climatic effects on soil.**—*C.E.P.B.*

8.7–97 551.577.61:551.311.2:631.4

Osborn, Ben (*U. S. Soil Conservation Service, Midland, Tex.*), **How rainfall and runoff erode soil.** *U. S. Dept. of Agriculture, Water: the Yearbook of Agriculture,* 1955:126–135, pub. **1955.** figs., 11 refs. **DA, DWB**—Force of raindrops may be 10 thousand times that of surface runoff during a summer thundershower, even on steep slopes. Erosive action of falling drops depends on amount and intensity of rainfall, diameter of drops and speed of drops striking soil. Large drops have much more erosive force than equivalent water in small drops. Largest drops are near 8 mm, median 1.5–4.25 mm, with storms of 0.1″ per hour to 10″ per hour, respectively. Large drops fall 26 to 30 ft per second vertically and much faster if driven by wind. Splash of drops dislodges soil and if on a slope it is easily washed away in sheet flow. Channel flow erodes by scouring, rolling, lifting, and abrading. Plant cover and mechanical structures or terracing can reduce raindrop and runoff erosion, respectively, though the latter is not effective if the former process is prevalent. *Subject Headings:* **1. Raindrop erosion 2. Soil erosion.**—*M.R.*

MEDICAL METEOROLOGY AND PUBLIC HEALTH

8.7–98 551.551.21:551.586

Zenker, H., **Über die Windgeschwindigkeit in geringen Höhen und ihre Bedeutung für einige bioklimatische Probleme.** [Wind velocity at small elevations and its importance for some bioclimatic problems.] *Angewandte Meteorologie,* 2(11):334–338, Feb. **1957.** 3 figs., table, 7 refs. **DLC**—Anemometer observations 2.5 m above a coastal dune at Heringsdorf (Usedom Is.) and 2 m above ground in a space among trees and buildings at Berlin-Buch and in a valley at Bad Berka are tabulated. Number of hours with speed >1, 2 and 3 m/s and seasonal diurnal variations of hours <1 and >3 m/s are plotted and discussed. The bearing of this on health is briefly discussed, especially lack of ventilation and impurity of air on valley floors at night. *Subject Headings:* **1. Wind speed near the ground 2. Bioclimatology 3. Germany.**—*C.E.P.B.*

8.7–99 551.54:612.275.11

Hawickhorst, Heinrich, **Das psychische Bild der Höhenkrankheit.** [The psychological syndrome of height sickness.] *Annalen der Meteorologie, Medizin-Meteorologische Hefte,* No. 5:14–15, **1951.** 3 refs. **DWB, DLC**—Describes observations in S. American Cordilleras up to 6500 m. Owing to lack of oxygen brain becomes ultra-sensitive. There is loss of critical faculty, poor concentration, indecision, inertia, loss of memory and especially excitability. These were common in rapid changes from lowlands to over 4000 m. *Subject Headings:* **1. Mountain sickness 2. Physiological climatology 3. Atmospheric pressure.**—*C.E.P.B.*

8.7–100 551.54:612.12:59

Nakamura, Hiroshi; Kunori, Shoichi; Oka, Toshihiko; and Soma, Saburo, **Researches on the low pressure endurance, Pts. 1–6.** *Low Temperature Science,* Sapporo, Japan, 3:339–361, **1950.** figs., tables, refs. In Japanese; English summary at end of each part. **DLC, DWB**—Endurance decreases progressively with age, for both mice and rabbits. Laboratory tests on endurance of various animals: rats, cats, pigeons, sparrows, frogs and mice under low pressure, effect of age, temperature, acclimatization, drugs (speed of reduction of pressure was 300 m/min). Mice survive the best. New born mice held for 4 min at 12 mm pressure, survived and grew normally. With mice symptoms of high altitude disease appeared at 260 mm; fatal at 106 mm. *Subject Heading:* **1. Low pressure effects on animals.**—*M.R.*

8.7–101 551.586:551.510.42:581.16

Collins-Williams, C. and Best, A. C., **Atmospheric pollen counts in Toronto, Canada.** *Journal of Allergy*, St. Louis, 26(5):461–467, Sept. **1955.** 4 figs., 2 refs. **DLC**—The results of daily atmospheric pollen counts carried out in Toronto during 1953–54 are summarized. Graphs showing total tree, grass and weed pollen counts expressed as number of pollen granules per cm^2 of exposed slide, the average daily count for each week, pollen counts of all trees whose pollen was identified, the average daily count, pollen counts for all weeds whose pollen was identified, etc., and a map of southern Ontario indicating its vegetation areas are presented. *Subject Headings:* **1. Pollen count 2. Pollen analysis 3. Toronto, Canada.**—*I.L.D.*

8.7–102 581.16:551.584.61 551.510.42:551.584.61

*Hewson, E. Wendell and Dingle, A. Nelson, **Dispersion and penetration of pollens and industrial contaminants.** Michigan. Univ. Engineering Research Institute, Contract AF 19(604)-792, Final Report, June 16, 1953 to Dec. 15, 1955, pub. Oct. **1955.** 95 p. 42 figs. (incl. photos), 8 tables, 10 refs., 10 eqs.—Results of a research project to study theoretically and empirically the dispersion of airborne particles and the penetration of these particles into buildings as a result of wind and turbulence, are presented in great detail on scatter diagrams, tables, etc. Equipment and facilities are well illustrated photographically. The work was done on the campus of the Univ. of Michigan during the 1954–1955 pollen season. Wind and pollen count diagrams, cross-sections and counts indoors are presented for various conditions (closed or open windows to varying degrees). *Subject Headings:* **1. Pollen dispersion 2. Pollen penetration into buildings 3. Turbulence effects 4. Ann Arbor, Michigan.**—*M.R.*

8.7–103 551.551:581.055

Rombakis, S., **Über die Verbreitung von Pflanzensamen und Sporen durch turbulente Luftströmungen.** [The distribution of seeds and spores by turbulent air currents.] *Zeitschrift für Meteorologie*, Potsdam, 1(11/12):359–363, Aug./Sept. **1947.** 2 figs., table, 3 refs., 60 eqs. **DLC**—An extension of Wilhelm Schmidt's famous (1925) work on plant seed and spore dissemination by turbulent currents (*see* 4B-39, Feb. 1953, *MAB*) to include rate of settling and other factors in a more precise manner than was possible for Schmidt. Statistical methods of physics and turbulence are also shown to be useful in a quantitative study of spore or seed dissemination. *Subject Headings:* **1. Turbulent dissemination of seeds 2. Spore dissemination. I. Schmidt, Wilhelm.**—*M.R.*

FOREST METEOROLOGY

See also: **Shelter belt research, Slovakia** (Fekete), 8.7–242; **Spacing interval in shelter belts** (Woodruff), 8.7–243; **Forest influences on rainfall** (Baier), 8.7–283.

8.7–104 551.501.1:551.501.9:632.187

Hardy, Charles E.; Syverson, Charles and Dieterich, John H., **Fire weather and fire danger station handbook.** *U. S. Forest Service. Intermountain Forest and Range Experiment Station, Ogden, Utah, Miscellaneous Publication*, No. 3, April **1955.** 81 p. figs., tables, photos, forms. **DWB**—Two types of stations are used for the fire weather service of the Northern Rockies: 1) Fire danger stations where only the data needed to compute the burning index (fuel moisture, relative humidity, wind, precipitation and lightning) are recorded, and 2) Fire weather stations, where in addition data for the U. S. W. B. (maximum and minimum temperature, hygrothermograph records, cloud types, thunderstorm and precipitation periods) are obtained. The manual goes into all phases of observations (instruments, exposures, records, transmission of reports, etc.) at these 2 types of stations, using many excellent photographs and schematic diagrams to illustrate each step or phase of the work. *Subject Headings:* **1. Fire weather observers handbook 2. Fire danger stations.**—*M.R.*

8.7–105 634.94:551.582(776)

Buell, Murray F. (*Rutgers Univ., New Brunswick*) and Bormann, F. H. (*Emory Univ., Georgia*), **Deciduous forests of Ponemah Point, Red Lake Indian reservation, Minnesota.** *Ecology*, Durham, N. C., 36(4):646–658, Oct. **1955.** 7 figs. (incl. photos), 5 tables, 18 refs.

DLC—Consideration is given in this study to the role of climate in the occurrence of deciduous forest in a coniferous zone. A table with climatological data for Redky, Minn., is given and the climate is described. *Subject Headings:* **1. Forest ecology 2. Local climatology 3. Red Lake Indian Reservation, Minn.**—*I.L.D.*

INDUSTRIAL METEOROLOGY

See also: **Freight and altitude** (Nivet), 8.7–87; **Climatic fluctuations and fuel requirements** (Manley), 8.7–211; **Behavior of stack gases in still air** (Leverett et al.), 8.7–232; **Snow accretion on power cable** (Hayashi et al.), 8.7–287; **Air conditioning calculation charts** (Goethe), 8.7–311; **Lightning protection for telephone wires** (Williams), 8.7–333.

8.7–106 697.5:699.86

Solvason, K. R., **Moisture in transient heat flow.** *Heating, Piping and Air Conditioning*, Chicago, 27(11):137–142, Nov. **1955.** 8 figs., table, 6 eqs. **DWB**—Measurements were made of the effects of moisture upon the heat flow in simple cases of transient heat flow established under control in laboratory apparatus. Samples of various materials, but mainly of the building insulation type, 7 in. square and up to 2 in. thick were enclosed in a special cell, between hollow plates through which liquid was circulated for heating or cooling. Variation of heat flow with time is shown for various amounts of moisture present and compared to both the experimental and calculated transient conditions for dry materials. Very substantial modifications to the heat flow under transient conditions result from the presence of moisture. *Subject Headings:* **1. Thermal properties of building materials 2. Moisture effects.**—*Author's abstract.*

8.7–107 551.524.36

Reiter, Fred M. (*Power and Light Co., Dayton, Ohio*), **Service hot water design for multistory buildings.** *Air Conditioning, Heating and Ventilating*, N. Y., 52(12):80–94, Dec. **1955.** 0 figs. (incl. photos), 25 tables. Port. and biog. data on author, p. 81. **DLC**—Among many technical data is a map of U. S. showing average number of hours in a year that the dry bulb temperature >85°, taken from the air conditioning atlas, published by the Industrial Press. Values range from <100 on west coast and Great Lakes–New England and Rockies, to >1000 hours in central Oklahoma, Texas and S. Arizona. *Subject Headings:* **1. Excessive temperature data 2. United States.**—*M.R.*

8.7–108 621.311.2

Verulam, Earl of; Angus, J. Houston and Chaplin, S., **The geography of power: its sources and transmission.** *Geographical Journal*, 118(3):251–266, Sept. **1952.** 8 figs., 4 photos. Discussion p. 266. **DWB**—After an account of the consumption of electricity in different countries, the harnessing of water power is described. The paper then briefly considers wind-driven generators, tidal power and internal heat. *Subject Headings:* **1. Power systems 2. Wind generators.**—*C.E.P.B.*

METEOROLGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Inspection of met. networks** (Nezdiurov), 8.7–26; **Drift-ice met. station** (Akkuratov), 8.7–40; **Drift-ice met. station** (Morozov), 8.7–41; **World's highest mt. lab.** (Bowen), 8.7–49; **Desert met. stations** (Hungerford), 8.7–50; **Fire weather observers handbook** (Hardy et al.), 8.7–104; **Airplane obs. of pack ice, Labrador-Greenland** (Rodewald), 8.7–121; **Tornado detection by sferics** (Dickson), 8.7–139; **Estimating vorticity advection** (Bundgaard), 8.7–170; **Analysis of wind circulation, N. Pacific** (Dean), 8.7–175; **Pilot balloon soundings, Iceland** (Georgi), 8.7–246; **Vapor pressure calculation** (Eckel), 8.7–253; **Soil moisture measurement** (Danilin), 8.7–296; **Radio investigation of auroras** (Kaiser), 8.7–341.

8.7–109 551.501.45:551.515:551.513.2

*Sherman, Leon, **On the synoptic use of a finite-amplitude wave equation.** Florida. ate Univ., Tallahassee. Dept. of Meteorology, Contract NONR-1600(00), Project NR-

082-071, Technical Report, No. 4, Jan. 15, **1956.** 17 p. 3 figs., numerous tables, 5 refs., eqs. **DWB**—It is current practice for NWAC to transmit computations of the mean zonal geostrophic wind and of the associated Rossby stationary wave lengths for various latitude strips and ranges of longitude. Since it has long been recognized that the simple Rossby wave equation for waves of infinite lateral extent upon a plane earth involves assumptions which are at best moot ones; and since the long wave theory of CRAIG and NEAMTAN is readily adaptable to such computations, it seems reasonable to at least test this more general theory in synoptic practice. In this report computation sheets have been prepared for the determination of the longitudinal speeds of propagation for disturbances of various classes of wave length, starting from the NWAC teletype data. At least upon theoretical grounds, it seems possible that these should lead to an improvement over the simple Rossby equation computations. This remains to be seen when they are tested. The computations are believed to be practicable for a major forecast center. *Subject Headings:* **1. Zonal perturbation computation 2. Waves in the westerlies.**—*Author's abstract.*

8.7–110 551.501.7:551.557:551.510.535

†Berg, Hellmut, **Windmessungen in grossen Höhen.** [Wind measurements at high altitudes.] *Germany. Deutscher Wetterdienst, Berichte,* 4(22):72–82, **1956.** 11 figs., 2 tables, 18 refs., eqs. Appendix: Pütter, P. St., **Isoplethen und Extremallinien bei linearer Interpolation eines quadratischen Gitternetzes.** [Isopleths and extreme lines in the linear interpolation of a square grid.] p. 81–82. 8 eqs. **DWB, DLC**—The various methods employed to measure winds at altitudes above 30 km are listed, their relative value in obtaining data on air motion in the ionosphere are evaluated from the standpoint of amount of data obtained, feasibility and cost, and the measurements of ionospheric winds obtained through the recording of ionospheric disturbances are reviewed. The evaluation and the reliability of data on ionospheric motion obtained with the impulse echo method, with radio astronomical method, and with other methods are discussed and the nature of the general circulation up to 120 km is briefly described. The appendix contains an outline of the procedure for determining points $f(x_1y)$ outside of a rectangular $x-y$ coordinate system by linear interpolation. *Subject Headings:* **1. Upper air wind measurement 2. Ionospheric winds. I. Pütter, P. St.**—*I.L.D.*

8.7–111 551.501.7:551.508.822

Hooper, A. H., **Radio-sonde trials at Payerne, 1956.** *Meteorological Magazine,* London, 86(1016):33–36, Feb. **1957.** 4 photos. **DWB**—Account of comparisons of 14 types of radiosondes from 13 countries in May and June 1956. Four types of wind-finding equipment were also tested. Radiosondes were sent up in groups of 4, 8, 9 and all 14 types. The main impression was of great diversity in design and circuits; weight varied from 300–2200 gm. *Subject Heading:* **1. Radiosonde comparison.**—*C.E.P.B.*

8.7–112 551.501.7:551.508.822

Klinkow, W. and Weide, R., **Über den Streufehler der Radiosonde "Modell Lang."** [Random errors of the "Model Lang" radiosonde.] *Zeitschrift für Meteorologie,* 10(10):308–313, Oct. **1956.** 7 tables, 5 refs. **DLC**—The "Model Lang" has been used in the DDR since 1947 but led to inconsistencies. R/s errors are of 3 types: systematic, scatter and accidental. For a number of coupled ascents (2 r/s on one balloon), mean differences of pressure, temperature and humidity are tabulated. Causes of errors are discussed; incomplete radiation shielding played a part, but it was not possible to separate random from accidental errors. *Subject Headings:* **1. Radiosonde errors 2. Lang radiosonde.**—*C.E.P.B.*

8.7–113 551.501.7:551.508.762

Maxfield, John E. and Selfridge, R. G., **On the intersection of two slender cones.** *Journal of Atmospheric and Terrestrial Physics,* 10(1):46–47, Jan. **1957.** 2 figs., table. **DWB**—Note on approximate volume of intersection of cone of a searchlight and cone of vision of a telescope, axes of cones intersecting. *Subject Heading:* **1. Searchlight calculations.**—*C.E.P.B.*

8.7–114 551.501.81:551.508.85:621.396.9:629.13

Stride, P. L., **Weather avoidance with airborne radar.** *British Communications and Electronics,* 3(4):184–190, April **1956.** 13 figs., 2 tables, 9 refs. **DLC**—Civil airlines are abou

to fit radar, mainly to avoid turbulence. Wave-length giving maximum range with heavy rain between target and radar is 5–6 cm; 3 cm gives good angular discrimination. Stabilization is necessary. The characteristics of Bendix RDR 1, RCA AVQ 10, Collins WP 101 and Ekco E 120 are tabulated and operational trials of 3.2 cm Ekco described. *Subject Heading:* **1. Airborne radar.**—*C.E.P.B.*

OBSERVATIONAL DATA

See also: **Climat. summary, Alert, N.W.T.** (Canada. Met. Div.), 8.7–18; **Met. data from Greenland, 1948** (Bouché, Taylor), 8.7–42; **Analysis of jet stream data** (Brundidge), 8.7–174; **Tropical fronts from an observer's log** (Lamb), 8.7–188; **Forecasting flowering date** (Van der Bijl), 8.7–210; **Lee waves ahead of a warm front** (Wallington), 8.7–252.

8.7–115 551.506.1(42)

Booth, R. E., **Looking back on 1956.** *Weather*, 12(3):85–86, March **1957. DWB**—In England and Wales 1956 was a year of extremes of drought, rainfall and cold. *Subject Headings:* **1. Weather 2. England 3. Wales.**—*C.E.P.B.*

8.7–116 551.506.1

*Great Britain. Meteorological Office, **Réseau Mondial 1933 [and] 1934. Monthly and annual summaries of pressure, temperature and precipitation based on a world-wide network of observing stations.** London, H.M.S.O., both **1956,** both 116 p. mainly tables. At head of t.-p.M.O.597, M.O.598. **GB-MO**—These two volumes of the series follow the usual lines. A number of additional data for 1931 and 1932 are given on p. vi–xiii of 1933, followed by the usual tables. 1934 is the last volume to be issued by the British Meteorological Office. Data for a number of Russian stations are missing. (For 1910–1932 issues, see 5A-95, Jan. 1954, *MAB.*) *Subject Headings:* **1. Réseau Mondial 2. Climatic data 3. World climate.**—*C.E.P.B.*

8.7–117 551.506.3(492)

*Netherlands. Meteorologisch Instituut, **Réseau Mondial 1935-1949. Monthly and annual summaries of pressure, temperature and precipitation.** De Bilt, Nov. **1954.** [17 p.] almost entirely tables. **DWB**—Annual summaries of pressure, temperature and precipitation for 1935–1949 are given for De Bilt, Netherlands, in the same form as the Réseau Mondial, with normals for 1849–1920 except for temperature which is for 1849–1929. *Subject Headings:* **Climatic data for De Bilt, Netherlands 2. Réseau Mondial 3. De Bilt, Netherlands.**—*M.R.*

8.7–118 551.506.8:634.11(826.2)

Ruggiero, Roberto Antonio, **La floración del manzano y su relación con las temperaturas vernales en el alto valle del Rio Negro.** [Flowering of the apple tree and its relation to winter temperatures in the upper valley of the Rio Negro.] *Meteoros*, Buenos Aires, 5(3):141–54, July/Sept. **1955.** 3 figs., 9 tables, 13 refs. Spanish and English summaries p. 141. **WB, DPU**—The author has studied the flowering of 70 varieties of apple trees (*Pyrus malus*) and its relationship to the autumn-winter temperatures of the years 1935, 1936 and 1937 Alto Valle region of the Rio Negro. The beginning and duration of flowering are analyzed and correlations between the "sum of hours of cold" and the beginning of flowering and between the "sum of hours of cold" and duration of flowering are established. *Subject Headings:* **Apple blossom phenology 2. Winter temperatures 3. Rio Negro, Argentina.**—*I.L.D.*

INSTRUMENT CARRIERS

See also: **Aerology: single station method of pilot balloon obs.** (Tanatar), 8.7–12; **Rocket obs. of x-ray emission** (Chubb et al.), 8.7–209.

8.7–119 551.507.351:629.19

†Singer, S. F. (*Univ. of Maryland, College Pk., Md.*), **Geophysical research with artificial earth satellites.** *Advances in Geophysics*, Ed. by H. E. Landsberg, 3:302–367, **1957.** 38 figs., 6 tables, 79 refs. **DWB, DLC.** Also issued as *Maryland. Univ. Physics Dept.*,

Technical Report, No. 53, 22 p. 38 figs., 6 tables, 79 refs., eqs. Mimeog. (Note: figs. not included in this Mimeog. version.) **DWB**—Systematic coverage of the uses and advantages of artificial satellites in geophysical (geomagnetic, geodetic and meteorological) research. The 8 fields of study treated in 8 chapters of Pt. 2 cover: 1) Earth's interior, 2) Albedo, thunderstorms, clouds and infrared emissions from lower atmosphere or surface, 3) Chemosphere (ozone, airglow and aurora), 4) Ionosphere, 5) Exosphere, 6) UV and X rays, 7) Cosmic rays and 8) Meteors. Part 3 deals with applications to broad problems (energy balance and solar-terrestrial relations, and part 4 with limitations of earth satellites of 3 types (inert, satellite. satellite with telemetering and satellite with altitude control). Advantages of earth satellites are discussed in introduction (location, coverage, cost and uniqueness). Good bibliography. *Subject Headings:* **1. Satellite observatories 2. Albedo measurements with satellite 3. Solar-terrestrial relationships.**—*M.R.*

8.7–120 551.507.352:551.508.77:551.578.11

Bigg, F. J.; McNaughtan, I. I. and Methven, T. J., **The measurement of rain from an aircraft in flight.** *Farnborough, England. Royal Aircraft Establishment, Technical Note No: Mech. Eng.* 223, Sept. **1956.** 14 p. 13 figs., 5 tables, ref. Mimeo. **GB-MO**—To measure size and concentration of raindrops from an aircraft in flight two methods were tried, a sooted slide and thin metal foil backed by fine wire gauze. The latter proved satisfactory using 0.001″ aluminium foil at 60-300 kn and 0.002″ above 300 kn. Calibration of imprint size *vs* drop size is described, including calibration of water drops on dyed filter paper *Subject Headings:* **1. Airplane rainfall measurement 2. Raindrop size meters.**—*C.E.P.B*

8.7–121 551.507.352:551.311.184(268.2):551.501.8

Rodewald, M., **Die Packeisgrenze zwischen Labrador und Grönland Mitte März 1957** [The pack ice boundary between Labrador and Greenland mid-March 1957.] *Wetterlotse* No. 114/115:87–88, March **1957.** fig. **DLC**—A flight from Thule (N.W. Greenland) to Agentia (S. Newfoundland) on March 15–16 was above cloud ("undercast") from 67° N 54½°W, but the pack ice edge was followed by radar. *Subject Headings:* **1. Pack ice 2. Airplane observations 3. Radar echoes from ice 4. Greenland Sea.**—*C.E.P.B.*

INSTRUMENTS

See also: **Radiosonde releases, Heard Island** (Borland), 8.7–44; **Radiosonde trials, Payerne, 1956** (Hooper), 8.7–111; **Radiosonde errors** (Klinkow, Weide), 8.7–112; **Searchlight calculations** (Maxfield, Selfridge), 8.7–113; **Air-borne radar** (Stride), 8.7–114; **Airplane rainfall measurement** (Bigg et al.), 8.7–120; **Cosmic ray instruments** (Shen, Singer), 8.7–207; **Comparison of evaporation measurements with Piché evaporimeter** (Michalik), 8.7–257; **Drop generators** (Magarvey, Taylor), 8.7–284; **Soil moisture measurement with carbon electrodes** (Danilin), 8.7–296; **Radioactive content measurement** (De Maio), 8.7–331.

8.7–122 551.508.25 551.521.6

Brewer, A. W. and Houghton, J. T., **Observed radiation fluxes in the atmosphere a levels up to 12 km.** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings*, London, Butterworth, **1956.** p. 571–576. 6 figs., 3 refs. **DWB**—A newly developed radiometer for measuring the upward and downward flux of long-wave radiation is described briefly. The results of measurement of radiation flux with such instruments mounted on an aircraft are discussed. Graphs showing the temperature change with elevation, the variation of the absorption of KRS5 with wavelength, the absorption curve for different wavelengths of water vapor, a comparison between the radiation measured at the ground or at a height of 1 km with that calculated from Elsasser's chart and a comparison between the observed radiation and that calculated with Elsasser's chart for water vapor, the path lengths being corrected for pressure, and the results of observations on low clouds are discussed. *Subject Headings:* **1. Radiation balance meters 2. Radiation flux 3. Radiation calculations 4. Absorption by water vapor.**—*I.L.D.*

8.7–123 551.508.25:551.21.63

Dörr, Fritz, **Ein UV-Filter für die Linie 2537 Å.** [A UV filter for the line 2537 Å.] *Naturwissenschaften*, Bonn, 44(8):256, April 15, **1957.** table. **DWB**—A filter is described consisting of crossed sheets of polyvinylalcohol colored with iodine, transparent about 2500 Å and then absorbent to 7500 Å. Maximum transmission of natural light is 14.4% at 2490 Å, 13.2 at 2537 Å, half-value width 270 Å. *Subject Heading:* **1. Ultraviolet filters.**—*C.E.P.B.*

8.7–124 551.508.43

Petit, M., **Un barographe logarithmique.** [A logarithmic barograph.] *Journal Scientifique de la Météorologie*, Paris, 7(27):255–258, July/Sept. **1955.** fig., photo., 7 eqs. English and Spanish summaries p. 255. **DWB**—A barograph whose indications reflect the linear pressure logarithm is achieved through a combined system of aneroid and differential capsules; the theory and design of the instrument are described. *Subject Headings:* **1. Barographs 2. Logarithmic barograph.**—*Author's abstract.*

8.7–125 551.508.7:551.579.5

*Sato, Tadashi; Murakami, Yosuke; Murai, Hiroshi and Sekikawa, Keiichiro, **Some measurements by new type of mountain infiltrometer, Pt. 1.** *Tokyo. Forest Experiment Station, Bulletin*, No. 83:39–64, Jan. **1956.** 25 figs., 36 photos., 10 tables, 18 refs. In Japanese; English summary p. 63–64. **DWB**—Infiltration data for 3 years (1952–4), obtained at 20 sites on forest and field land in a mountainous area in Iwate District of Japan, are tabulated and analyzed to show the influence of forests on runoff. The 36 photographs show the portable lysimeters and other equipment used on the slope sites, the artificial rainfall sprinklers, permeability testing device, and the forest, cover and soil conditions at the 20 sites, including many showing bad erosion. Curves show relations between duration and intensity of "rain," cover type, physical and mechanical properties of soil, thickness of leaf litter at the various sites. Soil profiles are also shown for the several sites. Infiltration rate is far higher in forests than in grass, eroded firebreak or footpath sites. In forests the exposure and stand, undergrowth, etc., have a marked influence. The first rainfall has a high rate of infiltration, but after 0 to 0.5 hours it decreases rapidly and from 0.5 to 2.0 hours approaches a constant. In volcanic ash a reverse tendency is observed. The following values were obtained as averages for last 15 minutes:

Forests	223 mm/hr	100%
Cut-over	146 "	65 "
Eroded	65 "	29 "
Grass cover	24 "	10 "
Foot path	4 "	2 "

Two different methods were compared: 1) MUSGRAVE's tube method, and 2) the mountain infiltrometer. Slight differences were noted, but the latter has many advantages on slopes. *Subject Headings:* **1. Infiltrometer studies 2. Infiltrometers 3. Forest influences on runoff 4. Iwate District, Japan.**—*M.R.*

8.7–126 551.508.71

Coulon, Jean and Gayrard, Georges, **Résistance variable avec l'humidité.** [Resistance varying with humidity.] *Académie des Sciences, Paris, Comptes Rendus*, 242(17):2120–2122, April 23, **1956.** fig., ref. Also their: **Mesure de l'état hygrométrique des gaz au moyen de résistances hygrométriques.** [Measurement of humidity in gases by means of hygrometric resistances.] *Ibid.*, 243(6):573–575, Aug. 6, **1956.** graph, 2 refs. **DLC**—In the first paper an electrical instrument is described which measures humidity in powders, pastes or granular products. The sensitive elements are made of natural aluminum silicates and the use of a megohmmeter permits direct reading of humidity values of sufficient accuracy for industrial measurement purposes. In the second paper a modification of the instrument is described which makes it suitable for measurement of humidity in gases. *Subject Heading:* **1. Humidity instruments.**—*G.T.*

8.7–127 551.508.7

Matzke, H. and Vilkner, H., **Über ein fernanzeigendes Psychrometer.** [Distance recording psychrometer.] *Zeitschrift für Meteorologie*, 10(10):289–295, Oct. **1956.** 8 figs. 26 refs. **DLC**—A ventilated psychrometer with small lag resistance thermometers is described and illustrated. It is suitable for microclimatic work. The wet thermometer has inside the radiation shield a thin-walled tube of porous pottery communicating with a flask of distilled water by a fine glass tube. Examples of records are shown. *Subject Heading:* **1. Aspiration psychrometers.**—*C.E.P.B.*

8.7–128 551.508.71:551.573

Taylor, R. J., **An electronic analogue of the saturated vapour pressure curve of water.** *Journal of Scientific Instruments*, 33(11):436–439, Nov. **1956.** 3 figs., 2 refs., 2 eqs. **DLC**—In connection with equipment to measure evaporation, a circuit is described, with wiring diagram, for measuring saturation vapor pressure by a complete electrical simulation of the psychrometric equation. It covers range from 0–30°C in three stages and is accurate to less than 1%. *Subject Headings:* **1. Vapor pressure measurement 2. Evaporation calculations**—*C.E.P.B.*

8.7–129 551.508.79:551.578.11

Yeo, D. and Coutts, H. H., **Use of glossy paper for determining droplet sizes.** *Nature*, London, 179(4565):864–865, April 27, **1957.** fig., 6 refs. **DWB**—Stains were produced on Invercarron Art Paper by droplets containing dye, $>150\mu$ from a microburette. For water $D=0.318(S)^{1.065}$ where D and S are droplet and stain diameters. *Subject Heading:* **1. Drop size measurement.**—*C.E.P.B.*

8.7–130 551.508.822

Centkiewicz, Cz., **Nowy typ radiosondy.** [New type of radiosonde.] *Przegląd Geofizyczny*, Warsaw, 1(1):81–83, **1956.** 2 figs. **DLC**—A detailed description of a new type of radiosonde produced by the Dutch firm of N. W. Philips Gloilampeafabrik is given. The characteristic feature of the new radiosonde is the elimination of all moving contacts. Besides that, the conventional consecutive transmission of thermometer, hygrometer and barometer readings has been discarded and all three meteorological elements are transmitted simultaneously without interruption. *Subject Heading:* **1. Radiosondes.**—*A.M.P.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Dynamic met. and weather forecasting** (Godske et al.), 8.7–5; **Northern Hemisphere anomaly charts** (U. S. Air Weather Serv.), 8.7–27; **Flight planning based on prog. charts** (Corwin), 8.7–85; **Weather situations favorable for hay making** (Williamson), 8.7–95; **Res. in world weather patterns** (Lamb), 8.7–179; **Wind-weather relationships, Hungary** (Czelnai), 8.7–235; **Synoptic cloud code** (Rogers), 8.7–270; **Radioactive fallout pattern forecasting** (Gilbert), 8.7–330.

8.7–131 551.509(023)

McAllen, P. F., **The weather forecast.** *Marine Observer*, 27(176):96–101, April **1957.** 2 figs. **DLC**—Popular article, reproduced from **The Sperry Review,** dealing with synoptic observations and reports (including upper air), charts, prebaratics, air masses, etc. In forecasting, especially radiation fog, very fine limits to which forecaster must work are emphasized. *Subject Headings:* **1. Weather forecasting 2. Popular meteorology.**—*C.E.P.B.*

8.7–132 551.509(728)

Portig, Wilfried, **Die Wettervorhersage in Mittelamerika.** [Weather forecasting in Central America.] *Umschau*, 57(7):212–213, April 1, **1957.** 2 figs. **DLC**—The chief difficulties of weather forecasting in San Salvador are the paucity of synoptic stations and absence of data from the Pacific. Thunderstorms coming from the SE are difficult to forecast, but most rain comes in showers from the E. Pacific and Atlantic hurricane tracks are shown

on a chart, also Northers of the dry season, dangerous to health. Difficulties of forecasting are increased by suddenness and violence of weather changes. *Subject Headings:* **1. Weather forecasting 2. San Salvador.**—*C.E.P.B.*

8.7–133 551.509.21

Blowers, K., **Using the shipping forecasts.** *Weather*, 12(3):87–91, March **1957.** 2 figs., table. **DWB**—Technical weather bulletins for shipping, introduced by B.B.C. in April 1956, can be used to replace Airmet. Precision can be obtained by station reports broadcast from Shannon, Paris and Scheveningen, and ships reports. *Subject Heading:* **1. Synoptic reports.**—*C.E.P.B.*

8.7–134 551.509.312:551.547

Miyamoto, H., **A note on the forecasting of weather transition by the pressure change, Pt. 1.** *Journal of Meteorological Research*, Tokyo, 5(5):401–408, June **1953.** 4 figs., 7 refs., 5 eqs. In Japanese; English summary p. 401. **DWB, DLC**—Comparative curves of pressure variation on top and at the foot of Mt. Fuji are presented and discussed. It is found that an agreement of the two curves indicates stable atmospheric conditions, while discrepancies between the curves point to atmospheric disturbance. *Subject Headings:* **1. Forecasting by barometric tendencies 2. Mt. Fuji, Japan.**—*G.T.*

8.7–135 551.509.317:551.524.7:551.515.1(54)

Ganesan, V. (*Met. Office, Santacruz Airport, Bombay*), **Upper and mid-tropospheric temperature changes associated with upper level troughs over north India.** *Indian Journal of Meteorology and Geophysics*, New Delhi, 6(3):225–232, July **1955.** 7 figs., table, 3 refs. **DLC**—Time-sections of upper air temperatures over Delhi and Calcutta based on two radiosonde ascents daily during the period April 14 to 27, 1952 are studied in relation to the synoptic situation and compared with similar time-section available for Ahmedabad. A detailed study of an upper level trough which passed across north India between Feb. 19 and 23, 1954 has also been attempted. It is noticed that large fluctuations of temperature in the upper and mid-troposphere are associated with the migration of upper level troughs, the temperatures generally rising to the rear of the trough line. A possible explanation for this feature is suggested. *Subject Headings:* **1. Upper level troughs 2. Upper air temperatures 3. Northern India.**—*Author's abstract.*

8.7–136 551.509.362:551.542

*§Austin, James M., **Sea-level pressure patterns associated with 500-MB contour patterns.** Massachusetts Institute of Technology, Contract N5ori-07803, Technical Report, No. 14, Nov. 15, **1953.** 17 p. plus 4 tables and 5 synoptic charts. 4 refs. **DWB**—The association between sea level and 500 mb patterns is obtained by analyzing the hydrostatic contribution of 500 mb height changes to pressure changes at sea level. The 500 mb height changes are also utilized to analyze the changing divergence fields in the upper troposphere. From this dual analysis of 500 mb changes, criteria are established for development of new surface systems and deepening or filling of existing surface systems. The forecast aids are supported by various empirical studies and are illustrated by three synoptic situations. *Subject Headings:* **1. Pressure correlations 2. Objective forecasting.**—*Author's abstract.*

8.7–137 551.509.5:632.9:633.491(08)

Epidemiology of potato blight. *Nature*, London, 179(4554):294–295, Feb. 9, **1957.** **DWB**—Account of a symposium arranged by British Mycological Society on Jan. 5, 1957. Among the speakers, J. M. Hirst said that weather was one of the factors in infection. J. Grainger described the "Auchincruive" blight forecast recorder and a further development, the "Auchin" blight forecast alarm. P. M. A. Bourke described use of synoptic charts in Ireland, blight weather being an influx of tropical maritime air. E. C. Large described 7 years of forecasting by Beaumont rules. *Subject Headings:* **1. Potato blight forecasting 2. Symposia.**—*C.E.P.B.*

8.7–138 551.509.5:621.317.7:551.461.0

Klein, —, **Wasserstände werden fernübertragen.** [Water levels are transmitted b radio.] *Umschau*, 57(6):164, March 15, **1957.** 2 figs. **DLC**—To enable a watch to be kep at Hamburg on tidal levels in the Elbe estuary, levels at Cuxhaven and Stade are transmitte by radio and recorded at Hamburg. A similar system is being installed on the Rhine. *Subje Heading:* **1. Tide gages.**—*C.E.P.B.*

8.7–139 551.509.52:551.501.83:551.515

Dickson, Edwin B., **Detection of developing tornadic activity.** *American Meteorologica Society, Bulletin*, 37(10):517–518, Dec. **1956.** fig., 9 refs. **DWB**—A condensed summary o findings of the Project Tornado-Sferics conducted by the Severe Weather Warning Center i 1954 and 1955, using Air Weather Service sferics stations at Altus Air Force Base, Okla Camp Chaffee, Ark., and Smoky Hill A.F.B., Kans., and operating at 10 kc. It was foun during May–Aug. 1955 that 61 out of 76 (80%) of records of "long bursts" of sferics wer later verified by reports of tornadoes, usually 1–3 hours after bursts began. The 76 fixe represent 1.7% of the total number of fixes obtained during the 4 months. Average rate o sferics in bursts was 26.2 pips/sec., the maximum 55/sec. Many tornadoes occurred, howeve without 10 kc. long bursts, but 80% were caught on 15 kc. *Subject Headings:* **1. Sferic tornado detection 2. Tornado forecasting from sferics.**—*M.R.*

8.7–140 551.509.58:551.576.1:629.135.

Frost, R., **The prediction of contrails as a problem of diffusion.** *Great Britain. Meteoro logical Research Committee, M.R.P.*, No. 830, rev. Dec. **1953.** 20 p. 4 figs., 7 tables, 18 refs eqs. Mimeo. **DWB**—Solutions by O. F. T. Roberts and O. G. Sutton of length an persistence of contrails as a continuous point source problem are discussed. Relations betwee length and width of a trail and size of droplets are examined. Effect of weight of water con densed per gram of fuel burned, and of freezing of droplets, are calculated. Computed trail are compared with observed trails on March 11, 1952 (27,000-36,000 ft) and March 4, 195 (25,000-34,000 ft). A general relation is found between theoretical evaporation times of ic crystals and persistence of trails. It is concluded that long and persistent trails should onl occur at temperatures below −40°C in an atmosphere which is supersaturated with respec to ice and in which some visible water is produced, or at very low temperatures at whic evaporation time of a spherical ice crystal of radius 15μ exceeds 7 min. *Subject Heading* **1. Condensation trail forecasting.**—*C.E.P.B.*

WEATHER CONTROL

See also: **Hail control, Magadino Plain,** 8.7–24; **Atmospheric pollution control** (Sambrook), 8.7–151; **Detection of pseudo-isomorphic ice particles** (Montmory), 8.7–265; **Airborne silver iodide dispensing burner** (Warren, Nesbitt), 8.7–266; **Growth of ice crystals in super-cooled fog** (Isono et al.), 8.7–285.

8.7–141 551.509.67:551.578.71

Albani, Felix, **Lucha antigranizo en Europa.** [Anti-hail measures in Europe.] *Meteoros* Buenos Aires, 4(3):245, July/Sept. **1954. DWB**—A review of various attempts at hail pre vention carried out in France and Switzerland, and of experimental studies on the mechanism of hail formation. *Subject Headings:* **1. Hail prevention 2. Hail formation 3. France 4. Switzerland.**—*I.L.D.*

8.7–142 551.509.67:546.57:546.15

§Tohoku, Japan. Electric Power Company, **Report of artificial rain-making, No. 7 July 1954; No. 8, Nov. 1954; No. 9, June 1955, and No. 10, Oct. 1955.** 54, 48, 33, and 79 p., respectively. Numerous figs., tables and charts (many fold.).—This series of reports on silver iodide seeding in the Tohoku District of Northern Honshu, contains further and more detailed results of the carefully controlled experiments with a dense and systematic network of seeding

arget and control stations in that area than were contained in the **"Report on Rain-Making n Japan,"** Vol. 1, 1954 (*see* 6J–290, Oct. 1955, *MAB*). Complete details of the meteorological nd technological aspects of each of a dozen cases of seeding in Jan.-March 1954, are accomanied by synoptic charts (surface, 850 mb and 700 mb) and isohyetal charts of the area howing actual amounts of rainfall at each station and seeding details. Statistical analyses of ach case are also presented graphically and discussed, and totals for period are compared with ontrol areas and with non-seeding days when storm conditions were similar. Issue No. 8 ontains 24 such case-history charts and analyses for July–Sept. 1954, No. 9 gives a thorough tatistical analysis of all AgI ground seeding tests during July-Dec. 1954, and No. 10 gives n even more detailed analysis of control-target, seeding-non-seeding days for Jan.–March 955. *Subject Headings:* **1. Silver iodide seeding tests 2. Tohoku District, Japan.**—*M.R.*

8.7–143 551.509.8

Teich, M. (*Inst. for Weather Forecasting, Potsdam*), **Bemerkungen zu einigen Volkswetrregeln für den Hochwinter.** [Remarks on some popular weather maxims dealing with midinter.] *Zeitschrift für Meteorologie*, Berlin, 9(3):77–84, March **1955.** 5 tables, 5 refs. **WB, DLC**—Popular weather maxims expressing a relationship between a warm Oct. or ov. and the following Feb. and Jan. are examined in the light of a series of temperature bservations for Berlin extending from 1769 to 1930, and compared with temperatures obtained om Central European series. Maxims are by themselves not very useful in forecasting. dditional weather criteria and a knowledge of circulation processes would enhance their rognostic value. *Subject Heading:* **1. Weather lore.**—*I.L.D.*

8.7–144 551.509.9:551.510.42

McGrath, W. R., **Administering a smoke control area.** *Smokeless Air*, 27(101):167–170, pring **1957. DWB**—A smoke control area is one where the emission of smoke is substantially educed; complete elimination of smoke is impossible at present. Questions of staff, surveys nd furnaces are discussed. *Subject Heading:* **1. Smoke abatement.**—*C.E.P.B.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

ATMOSPHERIC COMPOSITION

8.7–145 551.510.41:546.291

Cook, Melvin A., **Where is the earth's radiogenic helium?** *Nature*, London, 179(4552): 13, Jan. 26, **1957.** 9 refs., 2 eqs. **DWB**—During geological time $>10^{20}$ gm of helium should ave been passed into the atmosphere, but actual content is only 3.5×10^{18} gm. Hydrogen nd helium do not concentrate significantly in upper atmosphere and escape rate is only $1/10^7$ replenishment rate from lithosphere. The high ratio of He3 to He4 is also inconsistent. t is suggested that He4 in the atmosphere is still increasing and the high ratio is due to terrrestrial accretion of meteoric materials. *Subject Heading:* **1. Helium atmosphere.**—*C.E.P.B.*

8.7–146 551.510.41:546.264:551.583.14

Slocum, Giles (*U. S. W. B., Wash., D. C.*), **Has the amount of carbon dioxide in the mosphere changed significantly since the beginning of the twentieth century?** *Monthly Veather Review*, Wash., D. C., 83(10):225–231, Oct. **1955.** 3 figs., 3 tables, 26 refs. **DWB**—he physical evidence of CO_2 content of the atmosphere and the observational data on the mount of CO_2 present in the atmosphere obtained in the 19th and 20th centuries are sumarized and analyzed critically. Tables and charts showing data on trends of CO_2 content earth's atmosphere, physical and chemical processes adding or reducing atmospheric CO_2 ontent, the geographic distribution of selected CO_2 measurements made in the Northern emisphere, mean CO_2 values, etc. are presented. The author concludes that the question increase of CO_2 in the atmosphere cannot be answered satisfactorily owing to inadequate ata. *Subject Heading:* **1. Carbon dioxide trends.**—*I.L.D.*

ATMOSPHERIC POLLUTION

See also: **Smoke control area** (McGrath), 8.7–144; **Radioactive fallout and civil defense** (Gilbert), 8.7–330.

8.7–147 541.12:551.510.42:0

Chemical reactions in the atmosphere: Los Angeles Conference. *Smokeless Air*, 27(101) 204–205, Spring **1957. DWB**—Report of Conference on "Chemical reactions in urban a mospheres," Feb. 1956. Subjects discussed: oxidizing power of Los Angeles atmosphe during smog through formation of ozone by photolysis of low concentrations of NO_2, stud of photochemical reactors by infrared spectrometer, contribution of particulate matter t smog-forming reactions, etc. *Subject Headings:* **1. Atmospheric pollution conferences 2. Lo Angeles, Calif.**—*C.E.P.B.*

8.7–148 551.510.42:623.454.8:551.578.

Garrigue, Hubert, **Radioactivité de l'air et des précipitations.** [Radioactivity in th air and in precipitation.] *Académie des Sciences, Paris, Comptes Rendus*, 243(6):584–58 **1956.** table. **DLC**—Since May 31, 1956 [up to July 18] all precipitation at the Puy-d Dôme summit has been polluted with radioactive fission products. This is confirmed by sampling in flight on June 15. *Subject Headings:* **1. Radioactivity of precipitation 2. Puy de-Dôme, France.**—*Trans. of author's abstract.*

8.7–149 551.510.42(411

McIntosh, D. H., **Atmospheric smoke concentration measurements at Eskdalemui** *Meteorological Magazine*, London, 86(1016):36–41, Feb. **1957.** 4 figs. **DWB**—Seven yea of filter paper smoke concentration measurements at Eskdalemuir, 18 mi from nearest tow are analyzed. Minima on Sundays especially in summer. Maximum in March, minimu July. A decrease of 10–15% probably occurred between 1948 and 1955. Concentratio decreased with increase of wind speed, and was greatest with easterly winds in summer, S in winter (Newcastle) with a secondary maximum at 320–340° (Glasgow). *Subject Heading* **1. Atmospheric pollution measurements 2. Eskdalemuir, Scotland.**—*C.E.P.B.*

8.7–150 551.510.42:0

The mechanical engineer and clean air: an important conference. *Smokeless Ai* 27(101):177–183, Spring **1957. DWB**—Summaries of papers at a Conference in Londo Feb. 19–21, 1957, organized by the Institution of Mechanical Engineers. Papers dealt wit smokeless combustion of coal and fuel oil and removal of SO_2, grit and dust. Problems c iron and steel industry, cement, ceramic works, chemical industry, coal mines, road and ra transport and ships in port were discussed. The final session dealt with instruments an automatic control, and training of boiler operators. *Subject Headings:* **1. Smoke abatemen 2. Atmospheric pollution conferences.**—*C.E.P.B.*

8.7–151 551.510.42:551.509.

Sambrook, K. H., **Fuel oil and clean air.** *Smokeless Air*, 27(101):194–198, Spring **1957** Also: Roast, C. A., **The contribution of petroleum products to air pollution.** *Ibid.*, p. 198–200 **DWB**—Sambrook said increased use of fuel oil in industry is planned. Management of oi burners is described. Solid pollution by oil is negligible but SO_2 and SO_3 is appreciable an smuts are troublesome. Roast discussed kerosene heating appliances in relation to ventilation and pollution by gasoline and diesel-driven vehicles. If it were possible to replace all domesti coal usage by oil, pollution by domestic fires would decrease by 90%. *Subject Heading* **1. Atmospheric pollution control.**—*C.E.P.B.*

UPPER ATMOSPHERE—IONOSPHERE

See also: **Studies of minimum satellites** (Singer), 8.7–84; **Upper air wind measurement** (Berg), 8.7–110; **Spreading of sodium cloud and ionosphere** (Edwards et al.), 8.7–198; **Solar-ionosphere research,** 8.7–318; **Persistent meteor trails** (Chapman), 8.7–319; **Color of zenith twilight sky** (Gadsden), 8.7–325.

8.7–152 551.510.52:551.513.2:551.557

Defant, Friedrich, **Über die Struktur hochtroposphärischer Düsenströme insbesondere des subtropischen Strahlstroms über Nordamerika.** [Structure of the upper troposphere jet streams, particularly the subtropical jet stream over North America.] *Germany. Deutscher Wetterdienst, Berichte,* No. 4(22):126–133, **1956.** 6 figs., 8 refs. **DWB, DLC**—The author attempts to demonstrate the definite existence of a double structure in the upper troposphere west wind band and discusses the characteristics of this structure at different isobaric surfaces. An analysis of the air flow during the winter months shows three principal flow axes, namely a most northerly and most weakly developed axis, the principal flow axis which is the polar front-jet stream, and the third flow axis which is distinctly separate from the polar front axis. The flow patterns are described in detail and flow charts over North America for levels 700, 500, 300 and 200 mb expressed in monthly means for Dec. and March 1950 are included. A graph showing the oscillations of the polar front and of the subtropical jet stream during the winter season 1950/51 in meridian 90°W, a schematic representation of the mean meridional circulation during winter together with individual height levels selected by the author and meridional wind profiles at different levels above 80°W are presented. *Subject Headings:* **1. Jet stream structure 2. Upper troposphere structure 3. Upper airflow patterns 4. Double jet stream 5. North America.**—*I.L.D.*

8.7–153 551.510.53:523.51:621.396

Gill, J. C. and Davies, J. G., **A radio echo method of meteor orbit determination.** *Royal Astronomical Society, Monthly Notices,* 116(1):105–113, **1956.** 4 figs., plate, table, 11 refs. **DWB**—A radio echo system using three receivers spaced 4 km apart has been used to determine the orbits of individual meteors. About 200 orbits can be calculated from the meteor echoes photographed during a 24 hour period of observation. An analysis of Geminid meteors observed in 1954 indicates that the accuracy obtainable is limited to about ±2 km/sec in velocity by atmospheric deceleration, and to ±3° in radiant position by turbulent winds in the meteor region. *Subject Heading:* **1. Meteor echoes.**—*Authors' abstract.*

8.7–154 551.510.535:550.389

Bhar, J. N., **Relation between noon F2-layer ionization and magnetic dip.** *Journal of Atmospheric and Terrestrial Physics,* 10(3):168–172, March **1957.** fig., table, 6 refs. **DWB**—To depict true relation between noon fF2 and magnetic dip, solar zenith distance χ at noon is kept as a fixed parameter (0°, 10°, 20° or 30°). For $\chi=0$, fF2 has a minimum at magnetic equator and maxima at ±30° magnetic dip. For $\chi=20°$ and 30° peak at 30°N and minimum at equator are maintained but southern peak appears to flatten out. Neither F1 nor E layer ionization shows any variation with magnetic dip. *Subject Headings:* **1. F2 layer ionization 2. Magnetic dip.**—*C.E.P.B.*

8.7–155 551.510.535:523.3:621.396

Browne, I. C.; Evans, J. V.; Hargreaves, J. K. and Murray, W. A. S., **Radio echoes from the moon.** *Physical Society of London, Proceedings, Sec. B,* 69(9):901–920, Sept. 1, **1956.** 13 figs., 16 refs., eqs. Also: Evans, J. V., **The measurement of the electron content of the ionosphere by the lunar radio echo method.** *Ibid.,* p. 953–955, 2 figs., 5 refs., 2 eqs. **DWB**—In the first paper, observations of radio echoes from the moon on 120 Mc/s are described. It is shown theoretically that the ionosphere should rotate the plane of polarization, and that the angle of rotation is a measure of the total electron content of the ionosphere. By observing the slow fading on two frequencies with a separation of 1.5 Mc/s, it is possible to measure the

total angle by which the plane of polarization is rotated and the total electron content of the ionosphere. Evans describes preliminary results of such measurements. The numbers of electrons at Jodrell Bank are plotted for 0–10 h U.T. in Oct. and Nov. 1955; they are about twice electron content of parabolic layer estimated from Slough critical frequency data. *Subject Headings:* **1. Ionospheric electron density 2. Radio echoes from moon.**—*Authors' abstract, C.E.P.B.*

8.7–156 551.510.535

Grenet, Gaston, **La conductibilité électrique de l'ionosphère et les perturbations du champ magnétique terrestre de fréquence musicale et plus basses.** [Electric conductivity of the ionosphere and geomagnetic field disturbances in the audible and lower frequency ranges.] *Académie des Sciences, Paris, Comptes Rendus*, 242(3):401–403, Jan. 16, **1956.** table, 2 refs. Also: Benoit, René, **Sur le bruit radioélectrique basse fréquence du champ magnétique terrestre.** [On the radioelectric low frequency noise of the geomagnetic field.] *Ibid.*, 242(21): 2534–2535, May 23, **1956.** fig. **DLC**—The first paper contains theoretical considerations (involving ionospheric critical frequencies, conductivities and layer thicknesses) from which it appears that low-frequency electromagnetic waves cannot pass through the ionosphere and consequently the origin of geomagnetic field disturbances in the audible range must be other than extraterrestrial. Benoit reports measurements of low-frequency noise, made by himself in Bani-Abbes (Algerian Sahara). During a ten-day period only isolated noises (due to sferics) registered at the rate of one per min. It is concluded that either the time and place of measurement were exceptionally calm or low-frequency radio noise is entirely due to sferics, or both assumptions are true, which would confirm Grenet's theory. *Subject Headings:* **1. Ionospheric critical frequencies 2. Ionospheric conductivity.**—*G.T.*

8.7–157 551.510.535:523.51:621.396

Hawkins, Gerald S., **A radio echo survey of sporadic meteor radiants.** *Royal Astronomical Society, Monthly Notices*, 116(1):92–104, **1956.** 10 figs., table, 10 refs., 9 eqs. **DWB**—Radio echoes have been observed in two narrow-beam aerials over the period Oct. 1949 to Sept. 1951. An analysis of the hourly rate of echoes has given a measure of the radiant points of sporadic meteors. The radiants are found to be concentrated towards the plane of the ecliptic in the directions of the apex, Sun and antihelion points. The majority of meteors in space are moving in direct orbits about the Sun, and there is a dense complex of orbits in the region traversed by the Earth during the months May to Aug. *Subject Heading:* **1. Meteor echoes.** —*Author's abstract.*

8.7–158 551.510.535:523.3

Matsushita, S., **Lunar effects on the equatorial Es.** *Journal of Atmospheric and Terrestrial Physics*, 10(3):163–165, March **1957.** 3 figs., 7 refs. **DWB**—Equatorial Es at Huancayo occasionally disappears suddenly near noon or early afternoon. Local time of disappearance is earlier near full and new moon, i.e. during first half of periods of westward lunar electric current. *Subject Heading:* **1. Lunar ionospheric effects.**—*C.E.P.B.*

8.7–159 551.510.535

Mitra, A. P., **Night-time ionization in the lower ionosphere, Pt. 1, Recombination processes.** *Journal of Atmospheric and Terrestrial Physics*, 10(3):140–152, March **1957.** 8 figs. table, 13 refs., 9 eqs. **II. Distribution of electrons and positive and negative ions.** *Ibid.* p. 153–162. 6 figs., table, 7 refs., 17 eqs. **DWB**—In Pt. I variations of height, electron density and absorption at frequencies of 16 kc/s–18.3 Mc/s are used to obtain variations of effective recombination coefficient at night at 80–110 km. Near 80 km the coefficient increases appreciably immediately after sunset but at 90 km and above it decreases. This is discussed in connection with Nicolet's suggestion that an appreciable number of meteoric (atomic positive, x+) ions exist in the lower ionosphere. In Pt. II the distribution of various ions and electrons in the lower ionosphere at night is deduced. It is found that the concentration of x+ ions increases from a negligible value at 87 km to 7×10^3/cm^3 at 110 km and does not alter much all night. *Subject Heading:* **1. Ionospheric physics.**—*C.E.P.B.*

8.7–160 551.510.535:551.594.7

Price, R. E. and Green, P. E., Jr., **Measurement of ionospheric path-phase for oblique incidence.** *Nature*, London, 179(4555):372–373, Feb. 16, **1957.** 4 figs., 4 refs. **DWB**—Three techniques are described for direct measurement of changes of path-phase, involving transmission of short radio-frequency pulses having a highly stable carrier frequency. *Subject Heading:* **1. Ionospheric radio wave reflection.**—*C.E.P.B.*

8.7–161 551.510.535

Ratcliffe, J. A., **The ionosphere.** *Nature*, London, 179(4555):339–340, Feb. 16, **1957. DWB**—Radio exploration of the ionosphere is described. Critical frequencies of E and F1 layers agree with simple theory of production and recombination of electrons, but in F2 layer diffusion of electrons by large scale vertical movements is important. Changing patterns of reflected wave are attributed to moving irregularities caused by air movements in E layer, but not in F region. Variations of ionizing radiation from the sun, 'sudden ionospheric disturbances' and ionospheric storms are discussed. Part played by ionospheric scatter in short wave communication is described. *Subject Heading:* **1. Ionosphere.**—*C.E.P.B.*

8.7–162 551.510.535:550.38

Shinn, D. H. (*Marconi's Wireless Telegraph Co. Ltd., Great Baddow, Essex*), **The analysis of ionospheric records: ordinary ray, Pt. 1.** *Journal of Atmospheric and Terrestrial Physics*, London, 4(4/5):240–254, **1953.** 3 figs., 6 tables, 13 refs., 8 eqs. **DWB**—Tables are presented from which it is possible to construct the theoretical (h',f) curves for a "parabolic" layer (both for reflection from and for penetration through the layer) and also for a "linear" layer anywhere in the world, except at very high latitudes. The effect of the earth's magnetic field, but not that of electronic collisions, is included. Methods of deducing the electron density in the ionosphere have until now been based on calculations in which the effect of the earth's magnetic fields is neglected. Necessary modifications to two of these methods are described. *Subject Headings:* **1. Ionosphere theory 2. Magnetic effects on ionosphere.**—*Author's abstract.*

8.7–163 551.510.535:551.594.12

Shmoys, Jerry and Karp, Samuel N. (*both, Inst. of Mathematical Sciences, New York Univ.*), **Calculation of charge density distribution of multilayers from transit time data.** *Journal of Geophysical Research*, Wash., D. C., 61(2, Pt. 1):183–191, June **1956.** 4 figs., 2 refs., 37 eqs. **DLC**—An integral relation is derived between the electron density distribution of a multilayer and the frequency dependence of the time in which a radio pulse traverses the layer. This integral equation is then solved for the electron distribution by means of the Mellin transform, given the transit time function. The lack of uniqueness of this solution is discussed. Certain characteristics of the multilayer, for example, the minimum electron density, are given in terms of the Mellin transform of the transit time. *Subject Heading:* **1. Ionospheric electron density.**—*Authors' abstract.*

8.7–164 551.510.535:550.384:551.590.24

Volland, H., **Diskussion erdmagnetischer Beobachtungen bei Sonnenfinsternissen.** [Discussion of geomagnetic observations during solar eclipses.] *Beiträge zur Geophysik*, 65(4):331–346, **1956.** 16 figs., 4 tables, 6 refs., 4 eqs. German and English summaries p. 331. **DWB**—Decreased conductivity of E and F1 layers in an eclipse shadow is accompanied by a deformation of S_q current lines. This is shown by the solar daily geomagnetic variations during 4 eclipses (28.5.1900, 30.6.1954, 18.5.1901 and 30.8.1905). The measurements agree with those computed from a current model of the ionosphere, the agreement being better the quieter geomagnetically the day. *Subject Headings:* **1. Ionosphere models 2. Geomagnetic variations 3. Eclipse effects on ionosphere.**—*C.E.P.B.*

8.7–165 551.510.535:525.6

Weiss, A. A. (*Adelaide Univ., Physics Dept.*), **Solar tides in the F2 region from the study of night-time critical frequencies.** *Journal of Atmospheric and Terrestrial Physics*, London,

4(4/5):175–183, 1953. 5 figs., table, 7 refs., 4 eqs. **DWB**—Night-time critical frequency variations at 25 ionospheric stations are analyzed by season and by latitude for semi-diurnal solar tidal terms. The amplitude and phase of the vertical drift velocity of electrons so found are consistent with accepted tidal theory, and an estimate of the height-gradient of the vertical drift is obtained. Two parallel analyses are made, on the alternative assumptions that decay proceeds according to a recombination law or to an attachment law. The low values found for the decay coefficients preclude any decision as to which of these two decay processes is actually operative. *Subject Headings:* **1. Ionospheric critical frequencies 2. Solar tides.**—*Author's abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Dynamic met.** (Laĭghtman, Iudin), 8.7–9; **Heat balance** (Ogneva), 8.7–21; **Excitation of atmos. oscillations** (Sen, White), 8.7–225; **Semidiurnal atmospheric oscillations** (Haurwitz), 8.7–227.

8.7–166 551.511.12

Wexler, Harry and Sissenwine, Norman, **Committee on extension to the standard atmosphere. U. S. Weather Bureau and Geophysics Research Directorate (AFCRC), Co-sponsors.** *Journal of Atmospheric and Terrestrial Physics*, 10(3):181–183, March 1957. fig., table. **DWB**—The ICAO Standard Atmosphere is being extended to 300 km by 23 organizations. A plot of molecular scale temperature and table of temperature lapse, temperature, molecular weight and pressure (mb) are given. From 32–75 km values are "tentative" and above 75 km "speculative." *Subject Heading:* **1. Standard atmosphere.**—*C.E.P.B.*

8.7–167 551.511.2:551.515.21 551.511.2:551.513.1

Matano, H. (*Met. Research Institute, Kyoto Univ.*), **On the role of the lateral mixing in the cyclostrophic flow pattern in the atmosphere.** *Meteorological Society of Japan, Journal*, Ser. 2, 34(3):125–135, June 1956. 4 figs., 10 tables, 11 refs., eqs. **DWB, DLC**—The rotating flow system such as tropical cyclone or typhoon with nearly circular isobaric pattern is treated from the view point of the lateral mixing process and some basic physical relations are derived to interpret the characteristic behaviors of Namekawa's Main and Secondary Typhoons. The same idea is applied to the rotation of the fluid shell to explain the observed zonal motion at the sun's surface and of the earth's atmosphere at the tropopause level in the south of the polar cap. *Subject Headings:* **1. Cyclostrophic flow 2. Tropical cyclone circulation 3. Zonal circulation.**—*Author's abstract.*

8.7–168 551.511.2:531.6

White, Robert M. (*Air Force Cambridge Res. Cen.*) and Saltzman, Barry (*M.I.T.*), **On conversions between potential and kinetic energy in the atmosphere.** *Tellus*, Stockholm, 8(3):357–363, Aug. 1956. 2 figs., table, 19 refs., 11 eqs. **DLC**—From a consideration of the large-scale horizontal variations of individual pressure change and 500 mb temperature in a mid-latitude sector of the Northern Hemisphere, computations are made of the required mean conversion of potential energy into the kinetic energy of the horizontal wind systems. The order of magnitude of the estimate obtained is in agreement with that obtained by Brunt from considerations of the frictional dissipation of kinetic energy. In addition, the role of organized overturnings is investigated. It is indicated that overturnings in east-west vertical planes associated with the large-scale disturbances are of primary importance in effecting the release of potential energy. *Subject Headings:* **1. Energy dissipation in atmosphere 2. Potential energy-kinetic energy conversion.**—*Authors' abstract.*

8.7–169 551.511.33:536.2:536.33

Goody, R. M., **The influence of radiative transfer on cellular convection.** *Journal of Fluid Mechanics*, 1(4):424–435, Oct. 1956. 2 figs., 7 refs., 47 eqs. **DLC**—This paper presents an approximate solution of the problem of the onset of convection between plane-parallel plates heated from below when the fluid between them absorbs and emits thermal radiation.

A complete solution to this problem would be extremely difficult, and the equation of radiative transfer is therefore developed in two approximate forms, one appropriate to an opaque medium, the other to a transparent medium. This equation is then combined with the dynamical equations of the problem. The initial static state is investigated by use of the Milne-Eddington approximation, and it is shown that there can be very large variations of temperature near to the boundaries. The conditions for marginal stability are investigated both for motions which are restricted to the temperature boundary layer, and for motions which take place in the body of the fluid. In the former case it is found that a complete solution is provided by the approximate form for a transparent medium, and in the latter case a reasonable interpolation has to be made between results for the two approximate forms in order to complete the solution. The effect of radiative transfer both on the initial static state and on the dynamical equations is such that the fluid is stabilized. This stabilization could probably be detected in the laboratory under certain conditions. In the earth's atmosphere the critical Rayleigh number for large scale motions may be increased by a factor 10^5, while at the surface of the solar photosphere the factor may be as large as 10^{12}. *Subject Heading:* **1. Convective cells.**—*Author's abstract.*

8.7–170 551.511.6:551.501.7

Bundgaard, Robert C. (*Hdq., 1st Weather Wing, U. S. Air Force*), **Estimating vorticity advection.** *American Meteorological Society, Bulletin,* 37(9):465–472, Nov. **1956.** 12 figs., table, 3 refs. **DWB, DLC**—From an inspection of the ordinary upper tropospheric maps, it is possible to estimate fairly well their fields of vorticity advection. This estimating may be facilitated by considering some idealized examples relating the vorticity advection to the ordinary upper-air maps from which it is derived. Compared, incidentally, are two independent methods for mapping both the geostrophic and the actual vorticity advections from the independent variables, which have already been represented on the map. These typical examples are presented in a progressively developing sequence, each one more complex than the former, until a generalized model closely resembling a real jet stream major-wave is given. Finally, actual upper-air situations (300 mb during Project Hi-cloud Jan. 26–March 10, 1954 in central U. S.) resembling these idealized models, individually and in various combinations, are shown along with the synoptic distribution of overcast cirrostratus, specially observed as a part of this study. *Subject Headings:* **1. Vorticity advection 2. Upper air computations.**—*Author's abstract.*

8.7–171 551.511.6

Fortak, H., **Zur allgemeinen Berechnung von Suspensionsverteilungen in turbulenten Strömungen.** [General calculation of the distribution of suspended matter in turbulent currents.] *Beiträge zur Geophysik,* 66(1):65–78, **1957.** fig., 8 refs., 39 eqs. German and English summaries p. 65. **DWB**—The general initial value and boundary value problem for turbulent diffusion of suspended matter is reduced to the determination of GREEN's function for a considered domain. GREEN's function for a rectangular channel is determined under the assumptions that eddy viscosity and mean current speed may be constant all over the domain. The effect of sedimentation acted on by the force of gravity is considered explicitly. *Subject Heading:* **1. Turbulence theory.**—*Author's abstract.*

8.7–172 551.511.6

Scorer, Robert S., **Vorticity.** *Weather,* 12(3):72–84, March **1957.** 17 figs. **DWB**—This non-mathematical account first described relative and absolute vorticity and vortex lines. Vorticity in the atmosphere is created by friction, gravity and the earth's rotation (examples given); it is conducted by viscosity and on a larger scale by eddy viscosity. Stretching of vortex lines is then explained, and applied to convergence in a depression. Vertical motion is computed by vertical stretching of air columns deduced from changes in vorticity. Turbulence and its decay are explained. Author then turns to nearly pure vortices such as tornadoes or waterspouts, to vortex sheets at surfaces between layers, and finally to the mechanism of long waves and mountain waves in the atmosphere. *Subject Heading:* **1. Vorticity.**—*C.E.P.B.*

GENERAL CIRCULATION

See also: **Synoptic use of finite-amplitude wave equation** (Sherman), 8.7–109; **Structure of upper stratosphere jet stream, N. America** (Defant), 8.7–152; **Lateral mixing in the cyclostrophic flow pattern** (Matano), 8.7–167; **Cold outbreaks, Far East** (Suda), 8.7–189.

8.7–173 551.513.1:551.555.1

Malkus, Joanne Starr (*Woods Hole Oceanog. Inst.*), **On the maintenance of the trade winds.** *Tellus*, Stockholm, 8(3):335–350, Aug. **1956.** 9 figs., 3 tables, 14 refs., 15 eqs. **DLC**—A relation between the large-scale features of the lower trade stream and the effects of small-scale convective motions is investigated. The small-scale processes impose constraints upon the over-all circulation through non-adiabatic heating and the production of shearing stresses. These constraints may be formulated in terms of a theoretical model describing the mean flow in a section along the northern portion of the Pacific trade, which has previously been studied observationally in some detail. In a simplified frictionless model with non-adiabatic heating the flow exhibits qualitatively many of the important features of the trades, such as subsidence, and a downstream acceleration, increased vertical wind shear, and pressure drop. The motion and pressure fields become numerically related to the heating as observed, however, only upon the introduction of frictional stresses. It is found possible to describe the frictional stress distribution in the lower trades without resorting to direct measurements, which thus provide a later independent check of the model. The last sections of the paper consider possible quasi-steady rearrangements between the fields of motion, heating, and stress which might be regarded as steps in the slow fluctuations of the system about its average condition. This is done to inquire whether changes in any one of these properties will produce readjustments in the others acting to restore the mean or to accelerate the departure from it. Although such an analysis is handicapped by lack of knowledge concerning the interaction between the heating and stress distributions, one sample calculation suggests that a reduction of heating acts to relieve the subsidence and might thus be expected to restore the convection and thereby the heating. A stable coupling between small- and large-scale motions in the low-level trades is thus indicated, which may play a role in maintaining the high steadiness of the flow. The fact that the wind steadiness vanishes rapidly above the convective layer is clarified if this model is acceptable. *Subject Heading:* **1. Trade wind models.**—*Author's abstract.*

8.7–174 551.513.2:551.557:551.506.7

Brundidge, K. C., **Analysis of selected project jet stream flight data.** Texas Agricultural and Mechanical College. Dept. of Oceanography, Contract AF 19(604)-559, Scientific Report No. 10, Aug. **1956.** 62 p. 23 figs., 9 refs., eqs. **DWB**—This report consists of three parts. Pt. 1 describes B-47 Flight 24 in terms of isotach and isotherm patterns which provide such information as local time changes of wind and temperature and patterns of divergence, vorticity and vertical motion. Pt. 2 is concerned with a statistical study of the magnitude of local wind speed changes, drawing upon information from six B-47 flights including Flight 24. An equation is presented which might have some prognostic value for wind forecasts over very short intervals of time. B-47 Flight 12 and B-29 Flight 13, which provide a three-dimensional picture of the jet stream, are discussed in Pt. 3. A comparison is made of the jet streams studied in Pts. 1 and 3, leading to a brief discussion of the synoptic history of jet streams upon their arrival in the southerly latitudes. In addition, a description is given of a high-level stable layer occurring at the time of Flights 12 and 13 which seems to substantiate the theory of a thermally-indirect circulation just below the level of maximum winds. *Subject Headings:* **1. Jet stream analysis 2. Airplane observations.**—*Author's abstract.*

8.7–175 551.513.2:551.557:551.501(265)

Dean, Gordon A. (*Inst. of Geophysics, Univ. of Calif.*), **Examples of the mean three-dimensional wind circulation over the tropical North Pacific Ocean.** *Monthly Weather Review*, Wash., D. C., 84(3):87–102, March **1956.** 27 figs., 2 tables, 6 refs. **DWB, DLC**—Two mean wind flow patterns (Feb. and May 1954), one representing a "high index" and one a "low index" period over the tropical North Pacific, are investigated by cross sections and horizontal

analyses. The wind field is shown on cross sections near 105°E from 5° to 35°N lat. The horizontal variations of the wind are shown at 10,000 ft intervals throughout the troposphere and lower stratosphere. *Subject Headings:* **1. Winds over the Pacific 2. Upper air wind analysis 3. North Pacific Ocean.**—*Based on author's abstract.*

8.7–176 551.513.2

†Reed, Richard J. and Tank, William G., **Miscellaneous studies of polar vortices.** Washington (State). Univ. Dept. of Meteorology and Climatology, Contract AF 19(604)-1298, Occasional Report No. 4, Scientific Report No. 1, May **1956.** 21 p. 25 figs., 2 tables, numerous refs., eqs. **DWB**—Pt. 1 of this report is an analysis of the factors responsible for the lowering of temperature in an intensifying polar low and for a selected case which occurred near Baffin Island in Dec. 1953. An analysis is given of the cooling by long wave radiation and by vertical motion and of the advective temperature change. Adiabatic expansion accounted for most of the observed cooling. Pt. 2 "contains measurements of vertical velocities over a considerable part of the North American Arctic during ten consecutive synoptic periods. From temperature and vertical velocity measurements an estimate is made of the large scale vertical eddy flow of sensible heat at the 700 mb level." Pt. 3 is a comparison between the pattern of temperature about high latitude closed lows and the pattern about middle latitude lows. "Subdivision of the data into categories based on time of year, speed of motion and change of intensity failed to alter the pattern significantly." *Subject Headings:* **1. Polar vortexes 2. Polar lows 3. Vertical velocities.**—*I.L.D.*

8.7–177 551.513.2:551.557:551.553.21

Sutcliffe, R. C. and Bannon, J. K., **Seasonal changes in upper air conditions in the Mediterranean-Middle East area.** *I.U.G.G. Association of Meteorology, Rome, Sept.* 1954, *Scientific Proceedings*, p. 322–334, London, Butterworth, **1956.** 7 figs., 6 refs. **DWB**—The upper winds and temperature are studied for the Middle East area for the period of transition from spring to summer, comprising the onset of the monsoon in India. The westerly subtropical jet stream moves northwards and an easterly jet is established farther south in the latitude near Aden. The change takes place in much the same way each year and can be dated by objective criteria. The date varied over three weeks in the six years 1948–53 and the variations were clearly correlated with those in the dates of the start of the monsoon in India. The results may have prediction values. *Subject Headings:* **1. Upper air circulation 2. Jet stream variations 3. Monsoon fluctuations 4. Middle East.**—*Authors' abstract.*

8.7–178 551.513.7 551.524.36(76/77)

Green, Raymond A. (*Extended Forecast Section, U. S. W. B., Wash., D. C.*), **Weather and circulation of June 1956: another hot June in Central United States.** *Monthly Weather Review*, Wash., D. C., 84(6):236–241, June **1956.** 9 figs., 3 tables, 7 refs. Also: McQueen, Henry R. and Shellum, Harold J. (*both, Nat. Weather Analysis Center, U. S. W. B., Wash., D. C.*), **Heat wave from the intermountain area to the northern Great Lakes, June 9–13, 1956.** *Ibid.*, p. 242–251. 4 figs., 2 tables, 9 refs. **DWB, DLC**—In the first article a record number (7) of fronts crossed the North Pacific Coast into the U. S. in June 1956, producing unusually cool weather in the Pacific NW and unusually warm weather in the plains and later on downstream to New England. Details of circulation anomalies are shown in 5 and 15-day mean charts for N. Hemisphere. In the second article heat wave caused by development of an upper ridge attended by barotropic dispersion of energy downstream in the mid-troposphere illustrated by 500 mb Hovmöller time cross sections for June 2–14, 1956). Planetary wave patterns and anomalies for heat waves in general and for this particular heat wave are discussed in detail, and spatial and time distribution of maximum temperatures discussed and illustrated. *Subject Headings:* **1. Atmospheric circulation anomalies 2. Heat waves 3. Northern Plains, United States.**—*M.R.*

8.7–179 551.513.7:551.509.33

Lamb, H. H., **Research in world weather patterns.** *Marine Observer*, 27(176):101–110, April **1957.** 6 figs., 7 refs. **DLC**—Monthly anomalies of surface pressure and temperature,

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and rainfall as a fraction of normal, are regularly drawn for the Northern Hemisphere. Examples are shown and the characteristics being sought for are discussed. *Subject Headings:* **1. Atmospheric circulation anomalies 2. Long range forecasting.**—*C.E.P.B.*

ATMOSPHERIC DISTURBANCES

See also: **Synoptic use of finite-amplitude wave equation** (Sherman), 8.7–109; **Upper temp. changes assoc. with upper level troughs, N. India** (Ganesan), 8.7–135; **Sferics tornado detection** (Dickson), 8.7–139; **Lateral mixing in the cyclostrophic flow pattern** (Matano), 8.7–167; **Pressure change calculation** (Sadakov), 8.7–223; **Vertical velocity near moving fronts** (Diuviuk), 8.7–249; **Vertical velocity and thunderstorms** (Rein), 8.7–250; **Lee waves ahead of a warm front** (Wallington), 8.7–252; **Climate of St. Helena and Tradewind zone of S. Atlantic** (Lamb), 8.7–299; **Weather during winter monsoon, Fukushima Prefecture** (Yamashita, Kasugai), 8.7–317.

8.7–180 551.515.11

Spar, Jerome, (*New York Univ.*), **An analysis of a cyclone on a small synoptic scale.** *Monthly Weather Review*, Wash., D. C., 84(8):291–300, Aug. **1956.** 12 figs., 2 refs. **DWB, DLC**—A fast-moving, rapidly-deepening cyclone is analyzed mainly by means of hourly airways sequence reports in the Atlantic coastal plain of the United States. Six-hourly rainfall maps are presented showing the concentration of heavy rain along the cyclone path, and the strongly convective character of the cyclonic precipitation. Gusty surface winds are found mainly in the warm sector during the early stages of the cyclone. The momentum of the surface gusts is derived from that of higher layers and comes down to the surface in bursts through the unstable warm air. Because the stability of the frontal zone prevents the downward transport of gust momentum, the surface winds in the cold air are much lighter than in the warm air. However, in places the front is penetrated by the gusts, and the resulting vertical mixing brings warm air to the surface causing an acceleration of the surface warm front. As the cyclone deepens, the gust velocities increase in the cold air in proportion to the increase of pressure gradient. The momentum of the low-level jet at the top of the friction layer penetrates to the surface most readily when the surface pressure gradient force does not oppose the direction of the jet. An analysis of hourly pressure changes shows the existence of large-amplitude, higher-speed pressure pulses moving across the cyclone. The pulses result in deformation of the pressure field, the generation of secondary centers, and erratic motion of the cyclone. *Subject Heading:* **1. Cyclone analysis.**—*Author's abstract.*

8.7–181 551.515.2(266:72)

Hurricane [in] Mexican coastal waters. *Marine Observer*, 27(176):78–79, April **1957. DLC**—June 11–13, 1956, in about 16°48′N, 101°10′W travelling NNW. Gusts exceeded 100 kt. Weather and warnings are described. *Subject Headings:* **1. Hurricane 2. Mexican Coastal waters.**—*C.E.P.B.*

8.7–182 551.515.2

U. S. Weather Bureau. National Hurricane Research Project, **Objectives and basic design of the National Hurricane Research Project.** *American Meteorological Society, Bulletin*, 37(6):263–269, June **1956.** 12 refs. **DWB**—In addition to a description of the objectives of the National Hurricane Research Project which is sponsored by the U. S. Weather Bureau and which includes an account of the type of information to be collected and a listing of the research tasks assigned to the Research Operations Base in Florida, the general problem of the origin and development of hurricanes is reviewed. The inception of hurricanes, their structure, and movement, changes of intensity, development and floods are discussed. Diagrams showing the general organization of the project, and a model of hurricane circulation incorporating revisions based upon data from aircraft reconnaissance and a map showing the proposed network of radiosonde stations which will operate continuously for a 30 month period beginning 1 May 1956 are presented. *Subject Headings:* **1. National Hurricane Research Project 2. Hurricane research.**—*I.L.D.*

8.7–183 551.515.23

§Hughes, Lawrence A.; Baer, Ferdinand; Birchfield, Gene E. and Kaylor, Robert E., **Hurricane Hazel and a long-wave outlook.** *American Meteorological Society, Bulletin*, 36(10): 528–533, Dec. **1955.** 6 figs., 5 refs. **DWB.** Also issued as: Chicago. Univ. Dept. of Meteorology, Contract AF 19(604)-1293, Technical Report, No. 2, Feb. **1955.** 11 p. 5 figs., 5 refs. Also in: Its **Final Report,** Feb. **1957.** Sec. N (12 p.). 6 figs., 5 refs. **DWB**—Hurricane Hazel Oct. 15, 1954 is analyzed as an example of a tropical cyclone that reintensified in extratropical regions. The hurricane was caught in the circulation of a major cyclone or trough moving east from the Lakes region and intensifying the latter. Surface and upper air (300 mb) analysis and time cross sections as well as isallobaric charts for the region are presented. Trough movement is traced back to formations off the East Coast of Japan Oct. 4 to 11. *Subject Headings:* **1. Hurricane forecasting studies 2. Hurricane "Hazel" (1954) 3. Long wave influences on tropical cyclones.**—*M.R.*

8.7–184 551.515.3(261)

Limbert, D. W. S., **Waterspouts observed at Ocean Weather Station I.** *Marine Observer*, 27(176):110–114, April **1957.** 4 figs., 2 tables, ref. **DLC**—On June 27, 1954, O.W.S. "Weather Recorder" observed several waterspouts in 61°N, 15°20′W, on E flank of a ridge of high pressure. Lapse rate slightly exceeded dry adiabatic through lowest 65 mb. Pressure changes, wind veer and fall in dew point, suggest that waterspouts were visible accompaniment of a forming polar low moving southwards. *Subject Headings:* **1. Waterspouts 2. North Atlantic.**—*C.E.P.B.*

8.7–185 551.515.3

Waterspout [in] North Atlantic Ocean [and] Indian Ocean. *Marine Observer*, 27(176): 80–81, April **1957.** 2 figs. **DLC**—May 28, 1956, 42°28′N, 9°39′W, an unusual waterspout originated from a large CuNb and extended diagonally towards horizon (sketch). April 15, 1956, 1°16′S, 86°35′E, waterspout observed for 10 min (6 sketches). *Subject Heading:* **1. Waterspouts.**—*C.E.P.B.*

8.7–186 551.515.33(767)

Asp, M. O. (*U. S. W. B., Little Rock, Ark.*), **Geographical distribution of tornadoes in Arkansas.** *Monthly Weather Review*, Wash., D. C., 84(4):143–145, April, **1956.** 2 figs., 5 refs. **DWB, DLC**—The author presents data (plotted on a map) on the place of occurrence of tornadoes in Arkansas and the sections most subject to tornadoes. The characteristics of Arkansas tornadoes are described. A map shows tornado paths in Arkansas for the period 1870–1955. *Subject Headings:* **1. Tornado distribution 2. Tornado tracks 3. Arkansas.** —*I.L.D.*

8.7–187 551.515.4

Moiseev, A. P., **Iiul'skie grozy.** [July thunderstorms.] *Priroda*, Moscow, No. 7:126, July **1956. DWB, DLC**—Results of a study of the frequency of summer thunderstorms in the central part of European U.S.S.R. for the period 1915–1955 show that July is the month with the greatest mean number of thunderstorms and summer lightning (7.4 or 30.5% of the mean yearly number). Summer thunderstorm frequency for individual years deviates greatly from the overall mean, ranging from a maximum of 15 days (1940) to a minimum of 2 days (1955). The period from July 15–20 has the most thunderstorms, the maximum number being observed on July 17 (16 in the period studied). The popular belief that a hotter summer is accompanied by more frequent and severe storms, is not corroborated by the results of the study, at least for Moscow. *Subject Headings:* **1. Thunderstorm frequencies 2. Summer thunderstorms 3. Moscow, U.S.S.R.**—*A.M.P.*

8.7–188 551.515.8:551.506.5

§Lamb, H. H., **Fronts in the intertropical convergence zone: an observer's log and some reflections thereupon.** *Meteorological Magazine*, London, 86(1017):76–84, March **1957.** 4 figs., 6 photos, 7 refs. **DWB**—Extracts from weather log of "Balaena" sailing south from

Finisterre on Oct. 17, 1946 to 9°N 15½°W on Oct. 26, illustrated by synoptic charts and photos, show a frontal cloud system (StCu and ACu) in view from 17th to 23rd and caught up with again as a belt of CuNb on 26th. Relation to intertropical convergence zone over Sahara is discussed from logs of F. Rodd's Sahara expeditions of 1922 and 1927. On return voyage in April–May 1947 "Balaena" met no fronts north of 3°S. Other examples of fronts in convergence zone are quoted and equatorial rains are associated with cold fronts from rejuvenated subtropical anticyclones. *Subject Headings:* **1. Tropical fronts 2. Expeditions 3. "Balaena" Expedition, 1946–1947.**—*C.E.P.B.*

8.7–189 551.515.8:551.513.1

Suda, K. (*Forecast Sec., Central Met. Obs., Tokyo*), **A persistent cold-outbreak in the Far East related to the blocking situation.** *Meteorological Society of Japan, Journal,* Ser. 2, 34(3):137–146, June **1956.** 10 figs., 4 refs. **DWB, DLC**—A case study is made on the so-called northeasterly pressure pattern accompanied by persistent cold outbreak over the Far East. The period of investigation covers late Sept. and early Oct. 1954, when this peculiar pattern appeared with unusual distinctness. It is found that an intense cold vortex of Arctic origin, which is displaced southward to northeast Siberia in the course of world-wide decline of zonal index, gives rise to a strong cold air advection eastward along its southern margin. This cold advection is responsible for the establishment of the Northeasterly pattern and continues until the great store of cold air trapped by a blocking high is exhausted. The nature of cold vortex as to its vertical extent and its successive formation in lower latitudes is described. Also, the role of the strong westerlies as the generator of the cold air advection is discussed. *Subject Headings:* **1. Cold air outbreaks 2. Blocking action 3. Far East.**—*Author's abstract.*

8.7–190 551.515.81

Fortak, H., **Zur Berechnung der Neigungswinkel stationärer atmosphärischer Diskontinuitätsflächen.** [Calculation of angle of slope of stationary atmospheric discontinuity surfaces.] *Beiträge zur Geophysik,* 66(1):79–85, **1957.** fig., 8 refs., 23 eqs. German and English summaries p. 79. **DWB**—The various slopes of a stationary discontinuity of the order zero are derivable in a very simple manner. The application of the method to the treatment of a stationary discontinuity of the first order, which is formed always by the same particles, yields to a great number of possibilities (by reason of the continuity of all hydrodynamic functions) to calculate the slopes of the discontinuity. Moreover there is a number of conditions for the existence of such a discontinuity. *Subject Heading:* **1. Discontinuity surfaces.** —*Author's abstract.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Radiant heat exchange in atmos.** (Kondrat'ev), 8.7–8; **Sunshine variability, Heard Island** (Borland), 8.7–44; **Cosmic ray experiments, Antarctic** (Simpson), 8.7–46; **Radiation calculation** (Brewer, Houghton), 8.7–122; **Nocturnal temp. inversion, Poona** (Raschke), 8.7–219; **Effect of scattering on zenith twilight brightness** (Shtande), 8.7–327; **Aurora and airglow res.** (Chapman), 8.7–335; **Auroral emissions** (Lebedinskiĭ), 8.7–342; special bibliography on **Albedo,** p. 949.

8.7–191 551.521:628.8

Pallot, A. C., **The radiative environment of buildings and its effect on heat transmission.** *Institution of Heating and Ventilating Engineers, Journal,* 22:1–30, **1954/55.** 16 figs., 27 tables, 6 refs., 7 eqs. **DLC**—Heat exchange by radiation and convection through a roof is discussed, at different "sky temperatures" and wind velocities. Components of radiation are listed—average solar radiation on horizontal and vertical surfaces at Kew, reflectivity of building materials, long wave radiation. Observations in 1950/51 on a building near London (6″ concrete roof, 13½″ brick walls) are tabulated monthly and total effective radiation on roof and walls calculated. These values are reduced to a "normal" year in BTU/sq ft/hr and as effective radiation temperatures of environment. Examples of heat transfer U from interior

to exterior air (still and moving air) are calculated. Revised values of U are given for roof and walls for sheltered, normal and severe exposures. *Subject Heading:* **1. Radiation effects on buildings.**—*C.E.P.B.*

8.7–192 551.521.31

Averkiev, M. S., **Rasseiannaia radiatsiia bezoblachnogo neba.** [Diffuse radiation of a cloudless sky.] *Meteorologiia i Gidrologiia*, No. 5:29–32, May **1956.** fig., 5 tables, 10 refs., 4 eqs. **DWB, DLC**—The empirical formulas of Berlage, Sivkov and Kastrov are discussed and the direct relationship between diffuse radiation and the altitude of the sun and atmospheric transparency is discussed. The article contains tables giving the dependence of diffuse radiation of a clear sky upon solar altitude and atmospheric transparency, numerical values of the coefficients and errors in calculating diffuse radiation by means of approximate formulas. *Subject Heading:* **1. Diffuse radiation.**—*I.L.D.*

8.7–193 551.521.32

Hinzpeter, Hans, **Einfache Rechnungen und Messungen zur Global- und Himmelsstrahlung, III.** [Simple calculations and measurements of global and sky radiation, Pt. III.] *Zeitschrift für Meteorologie*, 11(1):1–10, Jan. **1957.** 7 figs., 11 tables, 9 refs., 3 eqs. **DLC**—For Pts. I and II *see Zeit. f. Met.*, 9(10):308–315, Oct. 1955 and 10(4):100–110, April 1956 (*see* 7.6–134, June 1956 and 7.11–185, Nov. 1956, *MAB*). In this part the effect of haze on the spectrum and total intensity of global and sky radiation is calculated for different haze absorptions (assumed gray), spectral regions and zenith distances. These agree better with observations than those calculated without haze absorption. Energy of sky radiation is displaced towards short wave lengths; spectrum of global radiation is little altered. Calculated sky radiation is too great for $\lambda < 0.4\mu$ and haze extinction in this region is taken as anomalous and modified accordingly. *Subject Heading:* **1. Spectral distribution of radiation.**—*C.E.P.B.*

8.7–194 551.521.32

Yamamoto, Gi-ichi (*Geoph. Inst., Tôhoku Univ.*), **The use of Rosseland's and Chandrasekhar's means in the line absorbing case (Pt. 2 of Radiative equilibrium of the earth's atmosphere).** *Tôhoku Univ. Science Reports, 5th Ser., Geophysics*, 6(3):127–136, June **1955.** fig., 5 tables, 4 refs., 26 eqs. **DWB.** Also his: **Radiative equilibrium of the earth's atmosphere: line absorption case (Summary).** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings*, p. 582, London, Butterworth, **1956. DWB, DLC**—The radiative equilibrium of the earth's atmosphere for a line-absorbing case in which the absorption coefficient is given by the Elsasser line-shape was investigated with application of the method extended by astrophysicists to reduce the general case, in which the absorption coefficient varies with wave-length, to the grey case with introduction of some mean absorption coefficients. In this investigation the well-known Rosseland and Chandrasekhar means were used, and the solutions were derived both for the pressure-independent line case and the pressure-dependent line case, the numerical values being obtained exemplarily for strong, moderate and weak lines of 15μ CO_2 band. The condition of the constancy of flux was satisfied within the errors of 7 per cent for the present exemplary cases. The comparison of the source functions for the pressure-independent and the pressure-dependent line cases show us clearly the stabilizing effect of the pressure correction predicted by Strong and Plass. Our source function for the pressure-dependent line case, however, differs from the solution obtained by King in the point that ours has a finite value at the top of the atmosphere except for the case of an infinitely strong line, while King's solution tends to zero regardless of the line intensity or the optical thickness. Although the reduction of the line absorbing case to the grey case with use of Rosseland's and Chandrasekhar's means could give, so to say, first approximate solutions of the problem, the present analysis suggests to us some hint on the possibility of the improvement of the solution. (For Pt. 1, *see* 6.6–198, June 1955, *MAB*.) *Subject Heading:* **1. Radiative equilibrium.**—*Author's abstract.*

8.7–195 551.521.32

Yamamoto, Gi-ichi (*Geophysical Inst., Tôhoku Univ.*), **Exact solution for a grey, finite atmosphere (Radiative equilibrium of the earth's atmosphere, Pt. 3).** *Tôhoku Univ. Science*

Reports, 5th series, Geophysics, 7(1):1–9, Aug. **1955.** 2 figs., 3 tables, numerous eqs., 5 refs. **DWB, DLC**—Exact forms of the source function and the flux for a grey, finite atmosphere were obtained under the boundary conditions that the radiation incident at the outer surface is zero and that at the inner surface is isotropic. Numerical computation of the values of the source function was carried out for the atmospheres of different optical depth. With use of these values as standard, the fractional errors in the values of the source function obtained by the method of the discrete ordinates were examined. *Subject Heading:* **1. Radiative equilibrium.**—*Author's abstract.*

8.7–196 551.521.326:535.33(09)

Barber, D. R., **A very early photographic observation of the spectrum of the night glow.** *Nature*, London, 179(4556):435, Feb. 23, **1957.** 7 refs. **DWB**—Records an unsuccessful attempt by Sir Norman Lockyer in 1890 in the Mediterranean to determine whether the spectrum of the night glow differed from that of direct and scattered starlight. *Subject Headings:* **1. Night sky spectrum 2. History of meteorology. I. Lockyer, Sir Norman.**—*C.E.P.B.*

8.7–197 551.521.326:535.33:546.33

Blamont, Jacques-Emile (*Lab. Phys., École Normale Supérieure, Paris*), **Observations de l'émission atmosphérique des raies *D* du sodium au moyen d'un appareil à balayage magnétique.** [Observations of atmospheric emission of sodium D rays by means of an apparatus with a magnetic scanning device.] (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 99–113. 12 figs. [incl. photos], 4 tables, 9 refs., eqs. English summary p. 99.) **DWB**—An apparatus using the anomalous Zeeman effect in sodium vapor for the study of the twilight emission of the sodium D lines is described, and the results of observations presented and discussed. *Subject Heading:* **1. Sodium emission.**—*Author's abstract.*

8.7–198 546.33:551.521.326 551.557:551.510.535

Edwards, Howard D.; Bedinger, John F. and Manring, Edward R. (*all, Air Force Cambridge Res. Center, Bedford, Mass.*) and Cooper, C. D. (*Georgia Univ.*), **Emission from a sodium cloud artificially produced by means of a rocket.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 122–134. 10 figs. (incl. photo), 2 tables, 5 refs.) **DWB**—Following Bates' suggestion, 3 kg of metallic sodium vapor were ejected into the atmosphere from 50 to 113 km by means of two Aerobee rockets. The rockets were launched at the beginning of evening twilight on 21 Jan. and 12 Oct. 1955. Enhanced sodium emission at 5890 Å was definitely observed visually, photometrically and spectrographically from 85 km to 113 km during twilight. No sharp time discontinuities in intensity were observed when the region was enclosed by the earth's optical shadow. No increase in emission was observed during the night. Possible explanations are given for the lack of emission below 85 km. Spreading of the sodium cloud indicated winds at the 85-km level to be 180 mph from the northwest and 100 mph from the southeast at the 110 km level. *Subject Headings:* **1. Sodium emission 2. Ionospheric winds.**—*Authors' abstract.*

8.7–199 551.521.326:535.33:546.33

Galperin, G. I. (*Geophysical Inst. of the Academy of Sciences, Moscow*), **The ratio of the intensities of the components of the sodium doublet in the twilight spectrum.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 91–94. fig., table, 11 refs., eqs.) **DWB**—The ratio of the intensities of the components of the sodium doublet was measured from photographs of twilight spectra obtained with a grating spectrograph which clearly resolved the two lines. The analysis of the measurements was carried out by two methods: (a) neglecting high-order scattering, and (b) by the use of the equation of transfer. The value obtained for the ratio is $1.30 \pm 20\%$. *Subject Headings:* **1. Night airglow spectrum 2. Sodium spectra.**—*Author's abstract.*

8.7–200 551.521.4:535.33:546.33

Tanaka, Yoshio (*Geophysics Research Directorate, U. S. Air Force Cambridge Research Center*) and Ogawa, Masaru (*Inst. for Optical Research, Tokyo Univ. of Education*), **On the**

chemiluminescence of the sodium *D* lines in the reaction between ozone and sodium vapour. (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 270–272. fig., 9 refs., 2 eqs.) **DWB**—The reactions between sodium vapor and ozone, and sodium vapor and atomic oxygen, probably including metastable molecular oxygen, were investigated experimentally. It was observed that ozone reacts with sodium vapor accompanied by a strong luminescence of the *D* lines; however, the luminescence was not observed in the other reaction. If the temperature of the sodium vapor was increased in the ozone-sodium reaction, the brightness of the luminescence was reduced. On the basis of the observed evidence, two reaction formulas were tentatively suggested for the excitation of the *D* lines in the reaction. *Subject Headings:* **1. Twilight spectra 2. Sodium *D* lines.**—*Authors' abstract.*

8.7–201 551.521.6:546.33

Hunten, D. M. (*Univ. of Saskatchewan, Saskatoon*), **Seasonal variations of twilight sodium emission.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 114–121. 2 figs., table, 19 refs., eqs.) **DWB**—Measurements of maximum intensity and height of maximum density over a two-year period are reported. The angular surface brightness varies between 5 and 44×10^7 quanta/cm^2 sec sterad; the average variation is between 6.5 and 34, with minimum at the end of June and maximum at the end of Feb. The number of atoms/cm^2 column may be found by multiplying these by 10. The height varies not more than 1 or 2 km about the mean value 84.5 ± 5 km. The only mechanism for the intensity variation not eliminated by other evidence is the change in atom-ion equilibrium with the length of the day. This must be coupled with considerable transport of neutral sodium from the polar regions in winter to explain the large amplitude of variation, but still encounters the difficulty that high intensities are observed for some time after the end of the polar night. *Subject Heading:* **1. Sodium emission variations.**—*Author's abstract.*

8.7–202 551.521.61

Gergen, John L. (*Minnesota Univ. Dept. of Physics*), **"Black ball": a device for measuring atmospheric infrared radiation.** *Review of Scientific Instruments*, N. Y., 27(7):453–460, July **1956.** 9 figs., table, 9 refs., 12 eqs. **DWB, DLC, DGL**—Since the infrared balance of the atmosphere has been calculated by numerous authors (Elsasser, Kaplan, Plass and others) but never actually measured, the desirability of a device such as the "Black Ball" (which can be installed in a radiosonde) is evident. The device is described and both theoretical and empirical characteristics set forth in text and graphical form. The best form tested was a 2″ to a side dodecahedron of balsa wood covered with model airplane tissue and glossy black dope. A thermistor is used to measure temperature, and the pressure switch on the radiosonde alternately switches on the ambient and the radiation temperature. A large dodecahedron (3″ on a side) surrounds the smaller one to serve as a convection shield. An example of a sounding on July 27, 1955 (0300GMT) over Minneapolis shows air temperature and equivalent radiation temperature to 30 mb, corrections must be made for convection and thermal time constants. *Subject Headings:* **1. Infrared radiation measurements 2. "Black Ball" construction.**—*M.R.*

8.7–203 551.521.63:551.521.326

James, J. F. (*Dept. of Physics, Univ. of Reading, Berks*), **Laboratory experiments on the day airglow.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 273–275. fig., 3 refs.) **DWB**—The passage of a beam of ultra-violet radiation through oxygen and nitrogen renders the path of the beam luminous. Experiments indicate that the effect is due to fluorescence of the gases. The nature of the resulting visible radiation is discussed, and an estimate made of the efficiency of the process. *Subject Headings:* **1. Ultraviolet radiation effects 2. Airglow investigations.**—*Author's abstract.*

8.7–204 551.521.64:550.38

Åstrom, Ernst (*Royal Institute of Technology, Stockholm*), **Focusing of paraxial rays in a magnetic dipole field.** *Tellus*, Stockholm, 8(2):254–259, May **1956.** 5 figs., 2 tables, 6 refs. 18 eqs. **DLC**—It is well known that a magnetic field of axial symmetry has a focusing effect for paraxial orbits. The field of the earth is of this type and it is shown that, if the cosmic

rays consist of protons, a bundle of orbits parallel at infinite distance is focused on the surface of the earth if the energy is about 10 GeV. The co-latitude of the bundle at infinite distance is about 2.2 times the co-latitude of the focal point. The asymptote to the orbits is about 22° further to the east than the focal point. There is also an infinite series of lower energies exhibiting focusing properties. The calculations refer to paraxial orbits, but a comparison with terella measurements shows that the focal energy and the above relation between the co-latitudes is appropriate down to about 50° latitude. *Subject Headings:* **1. Cosmic ray focusing 2. Geomagnetic effects.**—*Author's abstract.*

8.7–205 551.521.64:537.591.15

Norman, R. J., **The energy spectrum of extensive air showers.** *Physical Society of London, Proceedings, Sec. A*, 69(11):804-820, Nov. 1, **1956.** 6 figs., 2 tables, 34 refs., 18 eqs. **DWB**—The integral shower density spectrum from 20-1000 particles per square metre is measured with three-fold proportional counters 60 metres above sea level, and follows a law

$$\nu(\rho) = 540\rho^{-1.39\pm0.04}h^{-1}, \text{ for } \rho < 500 \text{ particles } m^{-2},$$

in agreement with previous Geiger counter results; an agreement which confirms energy loss measurements as a means of particle density determination. For $\rho > 500$ the exponent increases quickly, reaching 2.2 at $\rho = 1000$, which is typical of the value observed with ionization chambers. The density spectrum is analysed, allowing for effects of shower age on structure to obtain the distribution in number

$$S(N) = 2.3 \times 10^{-4}(N \times 10^{-6})^{-1.47-0.1}\, m^{-2}h^{-1},$$

with evidence for a rapid increase in exponent above $N = 10^6$ particles. Using cascade theory the latter is shown to be produced by a primary energy spectrum

$$\mathrm{V(E)} = 0.32(E \times 10^{-14})^{-1.5}\, m^{-2}h^{-1}\,\text{sterad}^{-1},$$

for $10^{13} < E < 10^{15}$, above which the exponent increases rapidly, reaching about -3 at $E = 10^{17}$ ev. Since shower primaries of these energies should be little affected by solar or terrestrial magnetic fields, this will be the form of the primary spectrum. *Subject Heading:* **1. Cosmic ray showers.** —*Author's abstract.*

8.7–206 551.521.64

*Rose, D. C.; Fenton, K. B.; Katzman, J., and Simpson, J. A., **Latitude effect of the cosmic ray nucleon and meson components at sea level from the Arctic to the Antarctic.** *Canadian Journal of Physics*, Ottawa, 34(9):968–984, Sept. **1956.** 7 figs., 2 tables, 8 refs. **DWB, DLC**—Results are presented of cosmic ray measurements taken at sea level during 1954–55 from the Arctic to the Antarctic. The equipment consisted of a neutron monitor and a meson telescope. Latitude effects of 1.77 for the nucleonic component and 1.15 for the meson component were measured. The longitude effect at the equator was much less than expected on the basis of the geomagnetic eccentric dipole and the longitude effect at intermediate northern latitudes shows that the longitude of the effective eccentric dipole is considerably west of that of the geomagnetic eccentric dipole. In a previous paper by the same authors, the positions of the equatorial minima were combined with other published cosmic ray measurements to calculate a new cosmic ray geomagnetic equator. In this paper new coordinates are derived on the assumption that these equatorial coordinates apply to a new eccentric dipole, and therefore, that the equatorial coordinates may be extended to high latitudes. When the complete results are plotted on these coordinates, it is found that an eccentric dipole representation of the earth's magnetic field is inconsistent with the combined observations at all latitudes. *Subject Headings:* **1. Cosmic ray measurement 2. Latitude effects on cosmic rays 3. Cosmic ray neutrons 4. Cosmic ray mesons.**—*Authors' abstract.*

8.7–207 551.521.64:551.508.25

Shen, K. Y. and Singer, S. Fred (*Maryland. Univ. Physics Dept.*), **Air-shower telescope to measure sidereal time variation.** *Maryland. Univ. Physics Dept., Technical Report*, No. 49, July **1956.** 8 p. 3 figs., table, 11 refs., eqs. **DWB**—A new experimental approach to measure the sidereal time variation of high energy cosmic radiation has been studied. The

apparatus consists of an "air-shower telescope" using only six small counter tubes and an "extensive" tray of GM tubes. The apparatus is sensitive to vertical showers and discriminates against showers with (projected) zenith angle greater than 10°; this directional efficiency is found to be about 90%. In subsidiary experiments, the apparatus has been used to measure the zenith angle dependence of air showers. We can therefore set up an arrangement of counters to detect only vertical showers of high energy. Preliminary results show a counting rate of 1 per 3 hours per recording station for vertical extensive air showers of energy $\geq 10^{15}$ ev. No statistically significant time variation has as yet been detected. The recording rate can be increased and better statistics obtained by multiplying the simple counting rate. *Subject Headings:* **1. Cosmic ray showers 2. Cosmic ray instruments 3. Cosmic ray variations.** —*Authors' abstract.*

8.7–208 551.521.64:523.74

Tandberg-Hanssen, Einar, **On the interpretation of sudden decreases in cosmic rays from the sun.** *Astrophysica Norvegica*, Oslo, 5(9):241-258, Sept. **1956.** 5 figs., 4 tables, 15 refs. **DWB**—The changes in cosmic ray intensity (CRI)—especially shortlived intensity decreases—and their relation to solar activity have been investigated. The results are: 1) The active regions responsible for shortlived decreases in cosmic ray intensity (CRI) are not necessarily associated with sunspots or flares or UM regions. They may have other characteristics than the active regions responsible for CRI *increases*. 2) There is no one-to-one correlation between CRI decreases and magnetic storms. Recurrent storms with gradual commencement (gc) often occur simultaneously with CRI decreases, and also *series of sc storms* (storms with sudden commencement) coincide with CRI decreases. 3) The investigation supports the view that cosmic ray emission is a normal quiet-sun quality. 4) CRI decreases are thought to be caused by a shielding process taking place in ejected clouds of ionized gas pervaded by magnetic fields. *Subject Headings:* **1. Cosmic ray decreases 2. Solar activity.**—*Author's abstract.*

8.7–209 551.521.67:551.507.362:523.74

Chubb, T. A.; Friedman, H.; Kreplin, R. W. and Kupperian, J. E., Jr., **Rocket observation of X-ray emission in a solar flare.** *Nature*, London, 179(4565):861–862, April 27, **1957.** 3 refs. **DWB**—Rocket observations in past 7 years have shown that quiet sun radiates sufficient X-ray energy between 10–100 Å to account for E region and sufficient UV (1216 Å) for normal D region ionization between 70–90 km. "Rockoon" ascents are described, fired by radio at 80,000 ft when a flare occurred; observations were obtained for one small flare and are discussed. Ionospheric disturbances are attributed to X-ray flares. *Subject Headings:* **1. Solar X-rays 2. Rocket observation 3. Solar flares.**—*C.E.P.B.*

TEMPERATURE

See also: **Service hot water design** (Reiter), 8.7–107; **Upper level temp. assoc. with upper level troughs, N. India** (Ganesan), 8.7–135; **Heat waves, central U. S.** (Green), 8.7–178; **Correlation between pressure and rainfall** (Vujević), 8.7–226; **Thermal winds** (Dedebant), 8.7–245.

8.7–210 551.524:551.506.8

Van der Bijl, W. (*Kansas State College, Manhattan*), **The constant temperature-sum as a basis for forecasting flowering date.** *Geofisica Pura e Applicata*, Milan, 34:246–252, **1956.** 3 tables, eqs. **DLC**—G. Hertlein's thesis (entitled **Phänologisch-meteorologische Untersuchungen zur Blühvorhersage bei den Obstgehlözen**) is discussed and critized on points where apparently significance is attached to results which require stronger statistical proofs. *Subject Headings:* **1. Accumulated temperature 2. Phenological forecasting.**—*Author's abstract.*

8.7–211 551.524.35:697(42)

Manley, Gordon, **Climatic fluctuations and fuel requirements.** *Scottish Geographical Magazine*, 73(1):19–28, April **1957.** 3 figs., 2 tables, 15 refs. **DLC**—A mean temperature

of 57°F at sea level is adopted as a datum below which demand for artificial heating rises linearly. "Central England," ½(Oxford+Lancashire) monthly temperatures are tabulated for 1721–1800, 1801–1880 and 1881–1955 and "interior heating load" calculated for each heating season as accumulated monthly deficit from 56°F, Sept.–May. Average is 101 month-degrees, range 74 in 1821–22 to 137 in 1739–40. A rise of 30% in temperature deficit in a season results in an additional requirement of 5–7 million tons of coal, nearly amount of imports (10 million). The figures are checked by decadal running means of snowdays in London area. *Subject Headings:* **1. Temperature variations 2. Fuel requirements 3. England.**—*C.E.P.B.*

8.7–212 551.524.37(410)

Booth, R. E., **The cold weather of February 1956 with special reference to temperatures at Kew during the last 75 years.** *Meteorological Magazine*, London, 86(1017):65–73, March **1957.** 4 figs., 4 tables, 4 refs. **DWB**—Feb. 1956 was the coldest month of present century at Kew except Jan. 1940 and Feb. 1947. Freezing days, temperatures between certain limits, and frost-degree-days are compared with Feb. in other years since 1879. Distributions of absolute minima in Feb. 1895, 1947 and 1956 are plotted for Gt. Britain. Accumulated departures of Kew Feb. mean temperature from 1871–1956 average show a high value in 1910–1928 and a steep fall since 1953. Cold periods are related to frequency of easterly winds. *Subject Headings:* **1. Severe winters 2. Great Britain.**—*C.E.P.B.*

8.7–213 551.524.37:634.9

Bünsow, R., **Frosthärte und Pflanzenverbreitung.** [Frost severity and plant distribution.] *Naturwissenschaftliche Rundschau*, 10(4):146, April **1957. DWB**—Discussion of O. Till's determinations of resistance of deciduous trees to frost. Results agree with distribution of trees. *Subject Headings:* **1. Frost damage to trees. I. Till, O.**—*C.E.P.B.*

8.7–214 551.524.37(43)

Knoch, Karl, **Eine Chronik der Winterstrenge seit 1766 in Norddeutschland.** [A chronicle of winter severity since 1766 in North Germany.] *Petermanns Geographische Mitteilungen*, 101(1):27–30, **1957.** fig., 2 tables. **DLC**—Feb. 1956 in Germany was exceptionally severe. This is shown by a table of sums of negative departures of daily mean temperatures (°C) in Berlin since 1766 in each month Nov. through March. This shows great variations in the severity of winter. In 1829–30 the sum was 791°C; 1955–56 owing to the mildness of the rest of winter, was only 313, not among the most severe 30. Statistics for individual months are discussed. *Subject Headings:* **1. Severe winters 2. Germany.**—*C.E.P.B.*

8.7–215 551.524.35:631.4 551.525.5

Schmid, Josef, **Der Bodenfrost als gestaltende und zerstörende Naturerscheinung in den gemässigten winterkalten Gebieten.** [Ground frost as a formative and destructive natural phenomenon in moderate winter-cold regions.] *Forschungen und Fortschritte*, 31(1):1–9, Jan. **1957.** 14 figs., footnote refs. **DLC**—Ground frost has become important in recent cold winters because of increased traffic and damage to streets. Geographical and geological characteristics and typical forms of stone circles and stone trains are shown. Methods of more exact investigation in artificial and natural conditions are described. A daily record is given of changes in soil volume, temperature and precipitation at 2 sites in Mainz-Castel in winter 1952–53, showing that every cold period raises the soil, especially if it is wet. Rises of up to 42 mm are referred to. In streets local risings are due to local penetration beneath the waterproof surface. Alteration of soil by frost is described. The nature of the thrust exercized by frost is explained. On slopes changes of inclination, transport of stones, soil movement and distortion of young trees are illustrated. *Subject Headings:* **1. Frost heaving 2. Frozen soil.**—*C.E.P.B.*

8.7–216 551.524.37:631.4

Schmid, Josef, **Veränderungen und Abtragung des Bodens durch Frosteinwirkung.** [Changes and removal of soil through frost effect.] *Umschau*, 57(5):140–142, Mar. 1, **1957.** 6 figs., 3 refs. **DLC**—Describes measurements with stakes in sloping ground, drawing out of

vertical stones by frost, and stone and block transport on slopes. *Subject Heading:* **1. Frost effects on soil.**—*C.E.P.B.*

8.7–217 551.524.37:551.311.2

Williams, P. J., **Some investigations into solifluction features in Norway.** *Geographical Journal*, 123(1):42–55, March **1957.** 5 figs., 4 photos, discussion p. 55–58. **DWB**—Solifluction in central Norway is described and illustrated. Preliminary experimental investigations of movement and soil temperature (with thermistors) are summarized. A number of processes which may cause solifluction are discussed, including ice content, grain size, water availability and rate of thawing and freezing. *Subject Headings:* **1. Solifluction 2. Frost action 3. Norway.**—*C.E.P.B.*

8.7–218 551.524.4:551.311.1(268)

†*Belmont, A. D., **Lower tropospheric inversions at Ice Island T-3.** McGill Univ. Arctic Meteorology Research Group, Contract AF 19(604)-1141, Scientific Report, No. 2; Publication in Meteorology, No. 4, Aug. **1955.** 57 p. numerous figs., 45 refs., 66 tables in Append.—The complete record of the first two years of radiosonde observations from the Polar Basin have been analyzed with respect to thermal inversions. An objective classification system was introduced to permit exact determinations of type, magnitudes of component layers, and frequencies of occurrence of inversions. The method has general applicability to other portions of the radiosonde ascent. A new unit of inversion intensity was introduced and appears to be an improvement over the use of lapse rate. Some new relationships of inversion characteristics are presented, and a general qualitative theory is suggested to explain the differences found with previous theory. *Subject Headings:* **1. Temperature inversions 2. Ice Island "T3" 3. Arctic Ocean.**—*Author's abstract.*

8.7–219 551.524.4:551.521.31(547)

Raschke, K., **Über das nächtliche Temperaturminimum über nacktem Boden in Poona (Indien).** [The nocturnal temperature minimum over bare soil in Poona (India).] *Meteorologische Rundschau*, 10(1):1–11, Jan./Feb. **1957.** 17 figs., 3 tables, 17 refs. **DWB**—Temperatures at 5 heights 1 mm to 10 m above dry bare soil at Poona were recorded with thermoelements on 183 nights Nov.–June 1954/55; wind was also recorded. Three types of vertical distribution were found: 1) radiation type with minimum at the ground—clear nights with wind; 2) radiation type with minimum 1–10 cm above ground and great temperature difference (3–8°C) between 1 and 10 m—clear calm nights; 3) advection type with weak minimum at some height above ground. Type 2 results from heat conductivity from warmed soil exceeding heat loss by long wave radiation from the air. Austausch is calculated for some temperature profiles. *Subject Headings:* **1. Nocturnal temperature inversion 2. Poona, India.**—*C.E.P.B.*

SOIL TEMPERATURE

See also: **Ground frost as a . . . natural phenomenon** (Schmid), 8.7–215.

8.7–220 551.525:631.48

Shul'gin, A. M., **Klimat pochv evropeĭskoĭ territorii SSSR v sviazi s pochvennoĭ zonal'nost'iu.** [Soil climate of the European U.S.S.R. in relation to soil zonation.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 6:18–24, Nov./Dec. **1955.** fig., 5 tables, 19 refs. **DLC**—An attempt is made to determine the relationship of the geographic distribution of soil temperature as a climatic element of the soil and the fundamental soil types of central and eastern parts of the European USSR. A map showing the isotherms of mean soil temperature at a depth of 20 cm during the warm season and the soil zones of European USSR and tables giving the variation of soil temperatures at a depth of 20 cm central and eastern part of European USSR as a function of soil zones, annual variations of soil temperature at 20 and 40 cm, dates of occurrence of specific temperatures at 20 cm at various points and warm season soil temperatures at 10 cm are presented. *Subject Headings:* **1. Soil climates 2. Soil temperature—soil type relationships 3. European U.S.S.R.**—*I.L.D.*

8.7–221 551.525.4

Singer, Irving A. and Brown, Robert M., **The annual variations of sub-soil temperatures about a 600-foot circle.** *American Geophysical Union, Transactions*, 37(6):743–748, Dec. **1956.** 13 figs., 3 tables, 5 refs., 4 eqs. **DWB, DLC**—To assist engineers in the computations of thermal stresses, thermal loads, and the economic depth to which a proton synchrotron should be buried, the Meteorology Group at Brookhaven predicted the annual variations of sub-soil temperatures to the depth of 20 ft. Measurements were made at four stations having various types of ground cover, and located on a circle having a diameter of 600 ft. The analysis of one year of data showed that differences of ground cover have an appreciable effect on the temperature at all measuring depths. Standard thermal diffusion coefficients for a sandy soil are too small to account for the observed range of annual temperatures. *Subject Headings:* **1. Soil temperatures 2. Annual soil temperature variations.**—*Authors' abstract.*

WATER TEMPERATURE

8.7–222 551.526.6:551.556

*Schweigger, Erwin, **Estudio comparativo de temperaturas de mar y el régimen de vientos entre los años 1954 y 1939/1953.** [Comparative study of sea temperatures and the wind regime between 1954 and 1939/1953.] *Compañía Administradora del Guano, Lima, Perú, Boletín Científico*, 2:53-64, **1955.** 10 figs., 3 tables, refs. **DWB**—The fall in surface sea temperature in 1954 amounting to 1.5°C as compared with a 15-year normal is found to be associated with a shift in the wind regime marked by increased southerly wind frequencies. Also the force of all wind showed an increase in 1954 above the 15 year normal of 1939-1953. A marked similarity was found between 1954 and 1942 in that the equatorial current was displaced southwards. Data giving the percentage of SE and S wind of the total wind frequencies for 1954 and 1939–1953 and quarterly means of sea temperature in 1942 and in 1954 and frequency diagrams of relationship between sea temperatures and wind frequencies are presented. *Subject Headings:* **1. Sea temperature variations 2. Wind effects on sea temperature drop 3. Wind frequencies 4. Equatorial ocean current.**—*I.L.D.*

PRESSURE AND WIND

PRESSURE

See also: **Mountain sickness** (Hawickhorst), 8.7–99; **Low pressure effects on animals** (Nakamura et al.), 8.7–100; **Forecasting by barometric tendencies** (Miyamoto), 8.7–134; **Sea-level patterns assoc. with 500 mb contour patterns** (Austin), 8.7–136; **Katabatic wind theory** (Ball), 8.7–238; **Orographic waves** (Queney), 8.7–251.

8.7–223 551.543:551.515.8

Sadokov, V. P., **K uchetu atmosfernykh frontov pri raschete izmeneniia davleniia v sredneĭ troposfere.** [Calculation of pressure changes in the mid-troposphere taking into account atmospheric fronts.] *Meteorologiia i Gidrologiia*, No. 7:14–19, July **1956.** fig., 2 tables, 2 refs., 16 eqs. **DWB, DLC**—The author presents a new procedure for solving the equations determining the change of pressure and height of front, investigations dealing with the influence of fronts on pressure change and on the dynamics of the fronts themselves. These problems are solved by using the equations of vortical velocity and of heat flow (under diabatic conditions). The development of equations for calculating pressure change in the mean troposphere and the rate of movement of fronts at different levels and potential temperature is carried out and their use is illustrated. *Subject Headings:* **1. Pressure change calculation 2. Frontal effects on pressure change.**—*I.L.D.*

8.7–225 551.543:551.511

†Sen, Hari K. and White, Marvin L. (*Nat. Bureau Standards, Boulder, Colorado*), **Thermal and gravitational excitation of atmospheric oscillations.** *Journal of Geophysical Research*, Wash., D. C., 60(4):483–495, Dec. **1955.** fig., table, 46 eqs., 16 refs. **DLC**—Previous work on the excitation of large-scale oscillations in an atmosphere on a rotating globe is extended

to include a unified treatment for both gravitational and thermal forcing functions and is applied to the solar and lunar semi-diurnal pressure variation, that is, S_2 and L_2, respectively. It is assumed that the heating is applied only at the base of the atmosphere and that the temperature gradient is constant in this region as in the actual troposphere. The solution of the problem consists of the usual Bessel's functions characteristic of a purely gravitational forcing function found by PEKERIS, plus a particular integral found by the method of variation of parameters. The total resonant amplification is obtained for the various atmospheric models used by JACCHIA and KOPAL. The hitherto neglected phase of the dynamical tidal oscillation is included in a treatment where complex variables are systematically employed to represent the magnitude and phase of observables. It is found that current atmospheric models favor the conclusion that thermal effects are far more important than the gravitational in producing the S_2 variation ($\simeq 15$) as compared with CHAPMAN's 1924 conclusion that they are of nearly equal importance. However, if one assumes, as did CHAPMAN, that eddy motion at the ground is the only heating source, then our conclusion is at odds with observed values of eddy conductivity found by Eiffel Tower measurements. A possible resolution of this paradox is the consideration of other heating sources. Balloon observations by RIEHL and the analysis of HAURWITZ are cited in support of this possibility. *Subject Headings:* **1. Atmospheric oscillations 2. Gravity waves 3. Dynamics of the atmosphere.**—*Authors' abstract.*

8.7–226 551.543:551.577.3:519.241.1(497.1)

Vujević, P., **Corrélations entre les pressions barométriques et les précipitations en Yougoslavie.** [Correlation between barometric pressures and rainfall in Yugoslavia.] *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, Butterworth, **1956.** p. 79–85. 6 tables, 4 refs. Summary in *Bulletin Scientifique*, Zagreb, Yugoslavia, 2(4):108, March **1956. DWB**—Using the formula of FRANK M. PHILLIPS (*Mon. Weath. Rev.*, 50:135–136, 1922), the author investigated the correlation of atmospheric pressure at Zagreb with the precipitation at Belgrade and vice versa. Tables give the precipitation and atmospheric pressure for the month of Feb. for periods covering 1888–1912, 1921–1945 and the terms of the equation from which correlation for Feb. was calculated. The correlation between pressure at Zagreb and precipitation at Belgrade is greater than the contrary correlation. *Subject Headings:* **1. Pressure variations 2. Precipitation variations 3. Correlation coefficients 4. Yugoslavia.**—*I.L.D.*

8.7–227 551.543.1:551.511.3

Haurwitz, B., **The standing semidiurnal oscillation in an atmosphere of variable depth.** New York. Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceanography. Contract AF 19(604)-1006, Scientific Report, No. 3, Sept. **1956.** 19 p. figs., 5 refs., 29 eqs. **DWB**—In order to show how the large-scale oscillations of the atmosphere are modified by a meridional temperature gradient a fluid layer is considered whose depth varied with the latitude. The particular oscillation considered is the standing semidiurnal oscillation. Two different types of depth variations are discussed. It is also shown how both cases can be solved by an approximation method which can be extended to other models where a direct integration is not possible. *Subject Heading:* **1. Semidiurnal atmospheric oscillations.** —*Author's abstract.*

8.7–228 551.543.1(98)

†Sepulveda, Gloria M. and Haurwitz, B., **The geographical distribution and seasonal variation of the semidiurnal pressure oscillation in high latitudes.** New York Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceanography. Contract AF 19(604)-1006, Scientific Report, No. 2, May **1956.** 41 p. 18 figs., 9 tables, 30 refs., 23 eqs. **DWB**—The amplitudes and phases of the semidiurnal pressure wave have been computed for sixteen polar stations. The data were analyzed to obtain a picture of the geographical and seasonal variation of this oscillation in the polar regions. At most of the stations the seasonal variation of the amplitudes was found to have a maximum in the equinoxes and a minimum in the summer. No definite seasonal variation was found for the phase, although a tendency was found for the latest phase to occur in summer and an earliest phase to occur in

winter. A simple expression is given for the geographical distribution of the annual mean of the standing semidiurnal pressure oscillation in polar latitudes. *Subject Headings:* **1. Semidiurnal pressure variations 2. Arctic.**—*Author's abstract.*

8.7–229 551.543.3

Schwerdtfeger, Werner (*Servicio Meteorológico Nacional, Argentina*), **Acerca del carácter de ciertas variaciones de la presión atmosférica.** [Nature of certain variations in the atmospheric pressure.] *Meteoros*, Buenos Aires, 5(1/2):87–90, Jan./June **1955.** figs., 5 refs. **DWB, DLC**—The correlation between pressure variation at a given place and that occurring subsequently at points situated east of a given meridian has been proposed by the author as a means of determining the predominant direction of movement of allobaric systems (*Archiv. für Met. and Geophys. Ser. A*, V. 4, 1951; *see* 3.3–152, March 1952; *Meteoros*, 4(1/2), 1954, *see* 6.5–64–May 1955, *MAB*). Various criticisms of the significance of these results which are important in forecasting pressure changes and in weather forecasting are answered by the author in the present clarification of this method. *Subject Headings:* **1. Pressure variations 2. Pressure change forecasting.**—*I.L.D.*

8.7–230 551.543.3 551.547.3

Takahashi, K. et al., **Long periodic oscillations of the atmosphere between low and high latitudes (summary).** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, Butterworth, **1956.** p. 358. **DWB**—An analysis of surface pressure and 500 mb heights over the Northern Hemisphere by harmonic analysis, assuming 25-, 35-, 45-, 65-days, 2.5- and 5-months periodicity, showed that oscillations in those assumptions were considered roughly as standing waves over the Northern Hemisphere. The oscillations of the phase angle of the 25-day and 5-months oscillations resemble that of the zonal current over the earth. The nodal line of the oscillations girdles the globe at lat. 30°N, and the phase of the oscillation is opposite on both sides of the line. The amplitude and phase of the oscillations are correlated with those of the harmonics of the solar activity change. *Subject Headings:* **1. Pressure oscillations 2. Upper air pressure oscillations.**—*I.L.D.*

WIND

See: **Accuracy of dead reckoning in the air** (Grocott et al.), 8.7–86.

TURBULENCE AND WIND DISTRIBUTION

See also: **Wind speed near the ground** (Zenker), 8.7–98; **Turbulence and seed dispersal** (Rombakis), 8.7–103.

8.7–231 551.551.5:519.2

Bullen, N. I., **The sampling errors of turbulence measurements.** *Farnborough. England. Royal Aircraft Establishment, Report,* Structures, No. 208, London, May **1956.** 14 p. 4 figs., 5 tables, 10 refs., eqs. Mimeo. **GB-MO**—Counts of gusts of 10 ft/sec or more obtained with a Comet above 27,500 ft and a Hermes do not follow Poisson distribution. Various other types were tried and negative binomial $(1+p-pt)^{-Mk}$ selected as best 2-parameter distribution. The method of fitting is described in an appendix. *Subject Headings:* **1. Turbulence spectrum 2. Airplane turbulence observations.**—*C.E.P.B.*

8.7–232 551,551.25:628.53

Leverett, M. C.; Rupp, A. F.; Beall, S. E. and Bornwasser, L. P., **Behavior of stack gases in still air: progress report for the period June 1943–March 15, 1945.** *United States. Atomic Energy Commission, AECD*-2090, April 12, **1950.** 17 p. 7 figs., 4 tables, 3 refs., 6 eqs. **DWB**—Theory and wind tunnel experiments are adduced which show that a stack discharging air vertically upward into still air at stack air temperature produces a cone-shaped body of moving air above the stack. The radius of this cone is shown to be, at height h,

$$R = r_s + 0.15h$$

r_s=stack radius, h=distance above top of stack. Its velocity is $V=V_s\left(\frac{r_s}{r_s+0.15h}\right)$ where V_s=stack velocity, and the concentration of a contaminant in it is $C=C_s\left(\frac{r_s}{r_{s+0.15h}}\right)$ where C_s=the stack concentration. These rules seem to break down for stacks less than about 2 in. in diameter, and have been tested only up to 8 in. diameters. *Subject Heading:* **1. Stack effluents.**—*Authors' abstract.*

8.7–233 551.552(438)

*Lewińska, Janina (*PIHM, Krakow*), **Kierunki wiatrów w Polskich Tatrach.** [Wind directions in the Tatra Mountains in Poland.] *Przegląd Geofizyczny*, Warsaw, 1(1):23–26, 1956. 2 tables, 11 refs. **DLC**—The study of wind directions observed during various periods from 2 to 21 years) at 16 stations was made difficult by the use of the inaccurate Wild wind rage, and the fact that the observation data were not uniform. However, the results show that predominant winds come from SW and S, and more rarely from W. The influence of the general baric circulation engendering winds from NW direction according to M. Sokolowski has not been found to exist. *Subject Headings:* **1. Wind data 2. Wind direction 3. Tatra Mountains, Poland.**—*A.M.P.*

WIND VARIATION

See also: **Seasonal changes in upper air conditions, Mediterranean-Middle East** (Sutcliffe, Bannon), 8.7–177; **Weather during winter monsoon, Fukushima Prefecture** (Yamashita, Kasugai), 8.7–317.

8.7–234 551.553.4:551.555.9:551.577.34(497.1)

Goldberg, J., **Climatic fluctuations in Yugoslavia and the circulation in the Mediterranean area (summary).** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, Butterworth, 1956. p. 357. **DWB**—An investigation of the climatic fluctuations in Yugoslavia based on observations in Zagreb (1862–1951) has been applied to a study of the fluctuations of the air pressure and the precipitation in the Mediterranean area. The results indicate a secular change of the Mediterranean circulation, especially an intensification of the etesian winds and the summer droughts dependent upon them. The increased intensity of the winds is a result of the secular increase of the pressure gradient between the Atlantic High and Low in southwest Asia. *Subject Headings:* **1. Etesian wind trends 2. Rainfall trends 3. Yugoslavia.**—*I.L.D.*

8.7–235 551.553.6:551.509.318(439.1)

Czelnai, L. Rudolf, **Adatok a Balaton szélviszonyaihoz főbb időjárási helyzettipusainkkal kapcsolatban.** [Data on wind conditions of Lake Balaton in relation to the principal weather situation types.] *Beszámolók az 1955-ben végzett tudományos kutatásokról* (issued as *Hungary. Országos Meteorológiai Intézet, Hivatalos Kiadványai*, Vol. 20, pub. 1955). p. 137–151, 1955. 5 figs., table. Russian and German summaries p. 137. **DWB**—Data on directional frequencies of strong, moderate and weak winds at Balatonkenese, Siófok and Keszthely are presented for 1954. An attempt is also made at coordinating wind frequencies with synoptic types as classified by Péczely (the Hess-Brezowsky types are found inapplicable to Hungary). *Subject Headings:* **1. Wind frequencies 2. Synoptic types 3. Hungary.**—*G.T.*

8.7–236 551.553.8(267:677)

Violent thundery squall [on] Somali coast. *Marine Observer*, 27(176):79, April 1957. **DLC**—On April 23, 1956, in 5°45′N, 49°15′E, wind veered from SW force 3 to NE 11 and backed to NW 11, with torrential rain, lightning and thunder. Probably associated with instability on intertropical front. *Subject Headings:* **1. Squalls 2. Somali coast.**—*C.E.P.B.*

VERTICAL DISTRIBUTION AND SPECIAL WINDS

See also: **Trade wind models** (Malkus), 8.7–173; **Etesian wind trends, Yugoslavia** (Goldberg), 8.7–234.

8.7–237 551.554

Elliott, William P., **A comparison of some approaches to the diabatic wind profile.** Texas Agricultural and Mechanical College. Dept. of Oceanography and Meteorology, Contract AF 19(604)-997, Scientific Report No. 6, Dec. **1956.** 8 p. 2 figs., 9 refs., 11 eqs. **DWB**—Several expressions for the wind profile in diabatic flow were compared with each other. Although the forms compared appear quite different, it was found that a great deal of similarity existed among them. It was concluded that accuracy of wind observations will have to be improved before it can be stated conclusively that one expression best describes the observed profiles. *Subject Heading:* **1. Wind profile theory.**—*Author's abstract.*

8.7–238 551.555.4:551.541(99)

Ball, F. K. (*Div. of Met. Physics, C.S.I.R.O., Melbourne*), **The theory of strong katabatic winds.** *Australian Journal of Physics*, Melbourne, 9(3):373–386, Sept. **1956.** 3 figs., 13 refs., 33 eqs. **DLC**—In regions where strong katabatic winds occur, notably Commonwealth Bay, Antarctica, there is often a sharp boundary between the strong winds and the comparatively calm conditions at sea. The seaward movement of this boundary across a coastal station is accompanied by a sudden onset of strong winds and the landward movement by their sudden cessation. The boundary has all the characteristics of a pressure jump line accompanying a sudden change in depth of the cold air. Furthermore, it is to be expected from theoretical considerations that a pressure jump will occur near the coast. A simple theory is developed from which various characteristics of the flow can be predicted, including the intensity of the jump and the deviation of the wind from the lines of greatest slope caused by the earth's rotation. These predictions agree moderately well with observations. *Subject Headings:* **1. Katabatic winds 2. Pressure jump 3. Antarctica.**—*Author's abstract.*

WIND EFFECTS

See also: **Wind waves and swell** (Shuleĭkin), 8.7–69; **Wind waves in a shallow sea** (Shuleĭkin), 8.7–70; **Shallow water waves** (Shuleĭkin), 8.7–72.

8.7–239 551.556:551.311.4:551.42

Verstappen, Herman, Th., **Influence of climate changes on the formation of coral islands.** *American Journal of Science*, New Haven, 252(7):428–435, July **1954.** 3 figs., 2 photos, 8 refs. **DWB**—The structure of the coral islands which lie on reef flats in Djakarta Bay reflects the important part played by the wind in the development of coral islands. The position of the shingle ramparts with regard to their respective sand islands is compared for a number of years. On maps of the same year the various islands showed a remarkable uniformity but the differences between former and later positions were considerable. These differences are attributable to the prevalence of strong west monsoons during later years. The coral shingle ramparts always appear to originate on the weather side of the reefs and are gradually shifted in the direction of the islands by the surf. *Subject Headings:* **1. Wind effects 2. Coral island formation 3. Djakarta Bay, Java.**—*I.L.D.*

8.7–241 551.556.2

Casperson, Gerhard, **Untersuchungen über den Einfluss von Windschutzanlagen auf den standörtlichen Wärmehaushalt.** [Investigations into the influence of wind protection on the local heat balance.] *Angewandte Meteorologie*, 2(11):339–351, Feb. **1957.** 4 figs., 12 tables, 29 refs. **DLC**—Observations of soil temperature at 2, 5 and 10 cm and air temperature at 5, 75 and 140 cm were made at Potsdam, in a garden sheltered by hedges and trees and in an open field. Soil was warmer at the sheltered site, especially at midday and with dry soil. Influence of wind direction, cloud and shading is also discussed. Air temperatures were slightly higher in sheltered site, with dry soil and E winds. Maxima and minima at 0 cm showed much larger differences but this effect had largely disappeared at 5 cm. Diurnal

ariation is plotted, including also that at 0.5 m from a hedge; it is larger in shelter, chiefly ecause of greater midday warming. *Subject Heading:* **1. Shelter belt effects.**—*C.E.P.B.*

8.7–242 551.556.2(437)

Fekete, Štefan, **Prvé poznatky z výskumu vetrolamov na Slovensku.** [First data on nelter belt research in Slovakia.] *Vodohospodársky Časopis*, Bratislava, 2(1):3–30, **1954.**) figs., 6 tables, 27 refs. **DLC**—Data obtained in measurement of micrometeorological onditions near shelter belts (Aug.–Nov. 1953) are presented in tables and graphs. The ements measured were wind speed, atmospheric temperature, soil temperature, evaporation nd humidity. Average values of these elements are given for various heights and various istances from the trees. It is found, among others, that the attenuating effect of single-row nelter belts on wind velocity (at vertical incidence) is larger but their effective range is smaller : higher wind velocities. The diurnal temperature distribution is more balanced and vaporation decreases near the shelter belts. Methods of measurement are discussed. *Subject eadings:* **1. Shelter belt effects 2. Slovakia.**—*G.T.*

8.7–243 551.556.2

Woodruff, N. P., **The spacing interval for supplemental shelterbelts.** *Journal of Forestry*, Vash., D. C., 54(2):115–122, Feb. **1956.** 6 figs., table, 7 refs. **DLC**—Wind tunnel studies ere conducted to obtain information on the mechanical reduction of wind velocity by a ystem of shelterbelts consisting of a principal belt followed by supplemental belts. Models 7-, 3-, and 1-row principal belts, and 1-, 2-, and 3-row supplemental belts were used to btain the information. Results are expressed in terms of percentage reductions of the open ind velocity. Information was obtained with several different spacings of the supplemental elts when used with a principal belt. Some results of tests on the so-called "narrow" plant-gs, i.e. single rows used without the benefit of a wide principal belt, are also given. *Subject eading:* **1. Shelter belts.**—*From author's summary*

8.7–244 551.556.81:551.468

Nakano, Masito (*Met. Res. Inst., Tokyo*), **On a problem concerning the vertical circulation sea water produced by winds, with special reference to its bearing on submarine geology nd submarine topography.** *Records of Oceanographic Works in Japan*, Tokyo, N.S., 2(2):68–, Oct. **1955.** 3 figs., 2 tables, 11 refs. **DWB**—An extensive treatment of the problem of the .ting in of harbors during the monsoon season due to vertical circulation of water induced the prevailing winds bringing sand and clay into the bay. Laboratory experiments are escribed and illustrated and quantitative data derived to develop a mathematical formula for .e effect of prevailing winds. Application to actual case of Suttsu Bay (west Hokkaido) nd Beppu Bay (northeast Kyushu). Conclusion is that offshore winds make bays shallow nd onshore winds deep if bed load is coarse. If the bed load is fine, the offshore winds deepen e bay and onshore winds make it shallow. *Subject Headings:* **1. Wind effects on depth of ays 2. Submarine topography 3. Beppu Bay, Japan 4. Suttsu Bay, Japan.**—*M.R.*

UPPER AIR WINDS

See also: **Upper air wind measurement** (Berg), 8.7–110; **Structure of upper troposphere jet stream** (Defant), 8.7–152; **Airplane obs. of jet stream** (Brundidge), 8.7–174; **Mean wind circulation, N. Pacific** (Dean), 8.7–175; **Jet stream variations, Mediterranean—Middle East** (Sutcliffe, Bannon), 8.7–177; **Spreading of sodium cloud and ionospheric winds** (Edwards et al.), 8.7–198.

8.7–245 551.557:551.524.7

Dedebant, G., **Una observación sobre el viento térmico.** [An observation on the thermal ind.] *Meteoros*, Buenos Aires, 5(4):369–372, Oct./Dec. **1955.** 3 eqs. **DWB**—A theoretical aper in which the author derives a criterion of synoptic turbulence in temperate latitudes $\beta_{xy})_{\text{crit.}} = 25°\text{C}/100$ km. *Subject Heading:* **1. Thermal winds.**—*I.L.D.*

8.7–245 551.557.551.501.7

Thorp, Johannes. **Ergebnisse von Pilotenaufstiegen im Gebiete von Island.** [Results of pilot balloon soundings in vicinity of Iceland.] *Zeitschrift für Geophysik*, Braunschweig, 4 (7/8): 352–361, 1928. 8 figs. 1 table. DLC —Upper air wind direction, frequency roses and seasonal data up to 15 km over or near Iceland for 1909, 1913/15, 1926 and 1927 are presented and analyzed in connection with air masses and synoptic conditions. The author's literature and speed determinations are included for analysis of the wind field over the North Atlantic. *Author's abstract.*
Headings: 1. Upper air wind analysis 2. Iceland.—*M.R.*

8.7–247 551.557.551.45.542 551.558.1

Pasthoven, R. (Regional Met. Centre, New Delhi). **Influence of orography on the upper winds over Mussoorie.** *Indian Journal of Meteorology and Geophysics*, 7(3): 189–194, July 1956. 4 figs. 1 table. 10 refs. DWB—The influence of the orographic features at Mussoorie on the upper winds in the lower levels of the atmosphere has been examined in this paper analysing the data of 500 pilot balloon ascents during the period, May 1950 to June 1955. It has been found that the influence of orography on the upper winds at Mussoorie extends to about 5000 ft (1.5 km) resulting in appreciable reduction of the wind speed on a large number of occasions. The frequencies of appreciable velocity reductions at various levels for winds blowing from different directions are presented and discussed. The data studied in this paper support the present theoretical concepts regarding some of the features of "standing waves." *Author's abstract.*
Headings: 1. Upper air wind analysis 2. Orographic effects 3. Standing waves 4. Mussoorie, United Provinces, India.—*Author's abstract*

8.7–248 551.557.35:523.74

Dvořák, M. **Die zonale Windkomponente im Atlantisch-Europäischen Sektor in Abhängigkeit von kurzperiodischen Schwankungen der Sonnenaktivität.** [Zonal wind component in the Atlantic-European sector depending on short-period variations of solar activity.] *Meteorologické Zprávy*, Praha, 10(1): 15–18, Jan.–Feb. 1957. 2 figs. 1 tables. 20 refs. DWB—Previous research into relations between solar activity and weather is summarized. Author calculates changes of zonal geostrophic component for 40°N–50°N, 50–60°N, 500 mb, 1948–56 to show differing isolated short-lived synoptic maxima. Low zonal circulation on the synoptic day increased considerably on the up and following day. High index circulation decreased a little over a maximum on the day and then decreased with however a 4-day dip then further increase. *Author's abstract.*
Headings: 1. Upper air wind variations 2. Sunspot effects.—*J.E.J.B.*

VERTICAL MOTION

See also Orographic influences on upper winds, Mussoorie Pasthoven, 8.7–247.

8.7–249 551.558:551.505.

Fridrich, J. F., O vertikálních zvlnění v oblastech zvlnění frontálních [Vertical movements in the regions of moving fronts.] *Akademie Věd ČSR, Geofysikální Sborník*, No. 2 (1957), 1958 (1959), 2 figs. 1 tables. 5 refs. 1 eqs. DLC —Formulae for vertical velocities in upper field of pressure are applied to cases of pressure distributions with moving warm and cold fronts. Numerical integration is employed. *Author's abstract.*
Headings: 1. Vertical velocities 2. Frontal zones.—*From author's abstract.*

8.7–250 551.558:551.515.4

Vitek, František. **The relation between a field of relative divergence and the occurrence of thunderstorms.** *Geofysikální Publikace Ústavní*, Prague, 8:4, 149–159, 1956. 1 figs. 9 refs. DLC —Relative divergence was calculated for 13 thunderstorm situations and the results are shown in a graph representing thunderstorm frequency correlations with relative divergence and average vertical velocity in the 1000–500 mb layer. It is concluded "that there really exists a direct proportionality between the vertical velocities of small magnitude of the order of cm sec^{-1} and the occurrence of thunderstorms, as well as in cases of more intensive vertical motions." *Author's abstract.*
Headings: 1. Vertical velocities 2. Thunderstorm dynamics.—*J.E.J.*

8.7–251 551.558.21:551.43

Queney, P., **Considérations théoriques sur le problème des ondes de relief: théorème simple des rotors.** [Theoretical considerations of the problem of orographic waves: the simple theory of rotors.] *I.U.G.G. Association of Meteorology. Rome Assembly 1954 Scientific Proceedings.* London, Butterworth, 1956. p. 251–259. ½ figs. 16 eqs. DWB—The author presents a mathematical treatment of the problem of rotors giving the general theory of stream lines in a "cat's eye" and its application to rotors and the establishment of orographic waves. *Subject Heading:* 1. **Orographic waves.**—*I.L.D.*

8.7–252 551.558.21:551.506.7:551.515.8:532.59

Wallington, C. E., **Lee waves ahead of a warm front.** *Weather and Flying.* London, 3 :121–123, June 1956. 5 figs., ref. DLC—Account of a glider flight from Camphill and upper winds and temperatures. The waves are synthesized from a reconstruction of topography from 5 idealized ridges and valleys. A warm front was approaching and lee waves varied from 4 to 9 miles wavelength. *Subject Headings:* 1. Lee waves 2. Warm front effects 3. Gliding.—*C.E.P.B.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: Growth of small aerosols with humidity change [illegible] 8.7–11

8.7–253 551.571.31:551.501.45

Eckel, O., **Zur Berechnung von Dampfdruck-Mittelwerten.** [On the calculation of mean values of vapor pressure.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 8 :61–65, 1957. 3 tables. German, English and French summaries p. 61. DWB—In Austrian climatological network, monthly means of vapor pressure are calculated from means of temperature and relative humidity, not from individual values of vapor pressure. At lowland stations the former gives means which are too low by about 0.1 mm at 7 and 21 h and in April–Sept. too high by 0.1–0.4 mm at 14 h. *Subject Heading:* 1. **Vapor pressure calculation.**—*C.E.P.B.*

8.7–254 551.571.32.45

*Maja, Mario, **Umidità relativa e tensione di vapore a Milano (Brera) da settanta anni di osservazione (1880–1949) : rappresentazione statistica dei due fenomeni.** [Relative humidity and vapor pressure at Milan (Brera) from 70 years of observations (1880–1949) : statistical presentation of the two phenomena.] *Milan, Osservatorio Astronomico di Milano-Merate. Pubblicazioni,* N.S., No. 7, 1954. 33 p. 4 graphs, 8 tables, numerous eqs. DWB, DLC—Relative humidity and vapor pressure data for Milan (1880–1949) are tabulated including the normal value for each day of the year, monthly averages for each month of the period and monthly maxima and minima. Four curves presented show the annual march of the two elements, a comparison of annual temperature and vapor pressure variation and annual averages of relative humidity. This study continues the one prepared by Schiaparelli for the period 1845–1879. *Subject Headings:* 1. **Humidity variations** 2. Milan, Italy.—*C.T.*

8.7–255 551.571.7:533.4

Assolin, Nicole, **Sur le spectre d'absorption de la vapeur d'eau et d'eau lourde dans l'ultraviolet extrême.** [Absorption spectrum of water vapor and heavy water in the extreme ultraviolet.] *Académie des Sciences, Paris, Comptes Rendus,* 242 [9] :2317–2320, May 7, 1956. 2 figs., 12 refs. DLC—The absorption spectra of H_2O and D_2O were analysed between 100 and 600 Å. They consist of diffuse bands superimposed on several continua. *Subject Headings:* 1. **Water vapor absorption bands.**—*Trans. of author's abstract.*

EVAPORATION

See also: **Evap. calculation** (Taylor), 8.7–128.

8.7–256 551.573(437

Kacvinský, Martin, **Výparnosť vody v Podunajskej nížine.** [Evaporation in the Danu bian lowland of Slovakia.] *Vodohospodársky Časopis*, Bratislava, 3(3/4):167–183, 1955 2 figs., 6 tables, 7 refs., eqs. Russian and German summaries p. 182–183. **DLC**—Monthl evaporation data (mean, maximum, minimum, upper and lower decile and quartile, deviations variance, frequency, etc.) are tabulated for Hurbanovo (1901–1950). Average evaporatio values are also presented as functions of temperature, relative humidity and wind speed. A comparison with evaporation data for Bratislava (1933–42) and Komarno (1933–38) show highest values in Bratislava (good ventilation and low relative humidity) and lowest in Hur banovo. The Wild evaporimeter is found to yield accurate results in addition to being eas to handle. *Subject Headings:* **1. Evaporation data 2. Czechoslovakia.**—*G.T.*

8.7–257 551.573:551.508.7

Michalik, Janina, **Porównanie pomiarów parowania ewaporymetrami Piche' na wolnyr powietrzu i w klatce.** [Comparison of evaporation measurements using the Piché evaporimete in free air and in an instrument shelter.] *Poland. Pánstwowy Instytut Hydrologiczno Meteorologiczny, Wiadomości Służby*, 5(1):43–47, **1955.** 4 figs., table, 8 refs., eqs. Russia and French summaries p. 47. **DLC**—The results of observations and calculations at th meteorological station of Bygdoszcz during 1951–1954 show that evaporation in free air i 1.5 greater than evaporation in an instrument shelter; there is a good correlation betwee evaporation and saturation deficit, which amounts to +0.9886. During summer, E. wind cause a greater saturation deficit and evaporation than W. winds. *Subject Headings:* **1. Evap oration measurements 2. Piché evaporimeter 3. Bydoszcz, Poland.**—*A.M.P.*

8.7–258 551.573:551.578.4

Richardson, W. E. and Harper, R. D. M., **Ablation polygons on snow: further observation and theories.** *Journal of Glaciology*, 3(21):25–27, March **1957.** 6 refs. English and Germa summaries p. 25. **DWB**—"Ablation polygon on snow" is used instead of "dirt polygon" for an array of shallow depressions in partly ablated snow beds, the ridges between which ar generally but not always marked by "dirt fringes." The depressions are attributed to ablatio by eddies in the lee of surrounding obstacles. The dirt fringes are attributed to the trajector of dirt particles normal to the surface. *Subject Headings:* **1. Ablation 2. Dirt polygons** —*C.E.P.B.*

8.7–259 551.573(437

Šermer, Artur, **Výskum výparu z vol'nej vodnej hladiny pre zistenie strát vody z nádrží iných vodných plôch.** [Investigation of evaporation from free water surfaces for the purpose o determining water losses from reservoirs and other water areas.] *Vodohospodársky Časopis* Bratislava, 2(2):93–116, **1954.** 12 figs., map, 12 refs., eqs. **DLC**—Results of evaporatio measurements made in Slovakia with a differential evaporation pan designed by J. Rón ar reported. Curves showing correlations between evaporation and other meteorological element (temperature, wind, humidity) as measured in Bratislava and Hurbanovo are presented From evaporation values measured at 16 stations and those calculated on the basis of tem perature data for 100 additional stations a map of actual (reduced) evaporation is drawn fo Slovakia for April 1–Nov. 15, 1953. *Subject Headings:* **1. Evaporation rate 2. Czechoslovakia** —*G.T.*

CONDENSATION

See also: **Nuclei growth rate** (Orr et al.), 8.7–22; **Cloud droplet interception** (Twomey), 8.7–272.

8.7–260 551.574.

Mason, B. J. and Hallett, J., **Ice-forming nuclei.** *Nature*, London, 179(4555):357–359 Feb. 16, **1957.** fig., table, 4 refs. **DWB**—Further tests showed that iodine crystals act as ice

orming nuclei below −14°C in the presence of aerosol particles, and cupric sulfide below −6°C. Cuprous iodide and vanadium pentoxide were active at about −15°C. It appears hat initiation and growth of ice on a foreign substrate are determined partly by other factors han lattice geometry. *Subject Heading:* **1. Freezing nuclei.**—*C.E.P.B.*

8.7–261 551.574.1:551.464

Mukherjee, Asoke Kumar (*Met. Off., Jodhpur*), **Theoretical considerations of Melander ffect.** *Indian Journal of Meteorology and Geophysics*, Delhi, 6(2):201, April **1955.** 2 refs. **)WB, DLC**—The Melander effect, namely the production of salt nuclei by evaporation of alt solutions, is considered of meteorological importance since the heat required for 1 gm of NaCl to escape from solution is greater than that calculated by LODGE et al., namely the order f 10^{-24} cm^{-2} sec^{-1}. The author finds that evaporation of 1 gm of NaCl as Na and Cl ions equires 3.62×10^{-3} cal, recombination of these evaporated ions into neutral NaCl requires $.49\times10^{3}$ cal and agglomeration of these neutral molecules to solid NaCl requires 1.19×10^{3} als. *Subject Headings:* **1. Melander effect 2. Salt nuclei.**—*I.L.D.*

8.7–262 551.574.1

Shvets, M. E., **O kondensatsii vodianogo para v atmosfere.** [Condensation of water apor in the atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 6:547–551, Nov./Dec. **1955.** 2 tables, 21 eqs. **DLC**—The theory of the condensation of atmospheric ater vapor is investigated theoretically from the point of view of turbulent exchange without aking into account the radiational inflow of heat. The problem of the condensation of water apor is regarded as a problem of the union of the temperature and humidity fields in the resence of limiting conditions

$$\left[\frac{\partial}{\partial n}\left(T+\frac{Lq}{C_{p\rho}}\right)=0\right] \quad \text{and} \quad \left[\frac{dN}{dt}=V_n-\frac{D}{m}\left[\frac{\partial y}{\partial n}\right]\right]$$

n a shifting boundary separating a region of saturated air from a region of nonsaturated air. *ubject Headings:* **1. Condensation of water vapor 2. Turbulent exchange.**—*I.L.D.*

8.7–263 551.574.1:551.577.1

Woodcock, A. H., **Bubbles, saltdust and raindrops.** *Oceanus*, Woods Hole, Mass., (3):17–21, Spring **1956.** photo. **DWB, DLC**—A summary of knowledge and progress ıade or to be made in study of sea salt nuclei by Woods Hole meteorologists. Processes at the ea surface, above the sea, in clouds, rain and in the atmosphere away from the sea are involved. nswers may lead to better understanding of rain production and to better ways of artificially ıducing precipitation. *Subject Headings:* **1. Saline nuclei 2. Rain formation 3. Meteoro-ɔgical research.**—*M.R.*

8.7–264 551.574.1

Yamamoto, Giichi and Ohtake, Takeshi (*both, Geophysical Inst., Tôhoku Univ.*), **Distinction etween fog and mist nuclei (electron microscope study of cloud and fog nuclei, Pt. 2).** *Tôhoku Iniv. Science Reports, 5th Series, Geophysics*, 7(1):10–16, Aug. **1955.** 7 figs. (incl. photos), tables, 5 refs. **DWB, DLC**—Fog and mist nuclei were collected at various places on different ccasions and were examined electron-microscopically. The result is that mist nuclei are ıainly composed of large sea salt nuclei, while fog nuclei are mostly composed of small com-ustion nuclei. In addition there is evidence that large sea salt nuclei in fog fall off rapidly. hese results will give support to the opinion that large sea salt nuclei are the most important ɜents for the initiation of precipitation by accretion mechanism in clouds. *Subject Headings:* **Fog nuclei 2. Mist nuclei 3. Saline nuclei 4. Electron microscope studies.**—*Authors' ɔstract.*

8.7–265 551.574.2:551.509.67

Montmory, R., **La détection des particules pseudo-isomorphes de la glace.** [Detection pseudo-isomorphic particles of ice.] *Puy-de-Dôme. Observatoire, Bulletin, New Ser.*, ɔ. 1:9–15, Jan./March **1955.** 4 figs., table, 5 refs. English summary p. 9. **DWB**—The

method for preparing a supersaturated solution of AgI in triethleneglycol is described. Such a solution may be used to detect pseudo-isomorphic ice particles. The process of nucleation by AgI and by other substances such as carbon or dust particles and other objects is discussed and photographs of AgI acting as center of nucleation are presented. *Subject Headings:* **1. Silver iodide nuclei 2. Nucleation.**—*I.L.D.*

8.7–266 551.574.2:551.509.62:629.135

Warren, D. R. and Nesbitt, M. V., **An airborne silver iodide dispensing burner.** *Melbourne, Australia. Aeronautical Research Laboratories, Mechanical Engineering Note,* No. 200, May **1955.** 20 p. 17 figs. **DWB**—An analysis has been made of the combustion conditions giving maximum efficiency in the dispensing of silver iodide for rainmaking purposes. A burner has been designed which, with its fuel tank and control gear could be attached to commercial aircraft as a self-contained automatically-operated pod. It has been shown that the conventional use of kerosene or petrol to maintain combustion is unnecessary, and that the combustion of an acetone solution of AgI can be arranged to give equal efficiency in the production of active nuclei. A brief study of the kinetics of activity decay has shown that the rate of decay from four different dispensing systems is proportional to concentration to the power 1.5. This gives some support to the view that decay is due to nuclear aggregation. *Subject Heading:* **Airborne AgI smoke generators.**—*Authors' abstract.*

8.7–267 551.574.42:450

Giacomelli, Raffaele, **Per l'etimologia di galaverna e di calabrosa.** [On the etymology of soft rime and hard rime.] *Lingua Nostra,* 17(2):38–42, June **1956. DLC**—The origin of the Italian expressions *galaverna* and *calabrosa* is analyzed. Components of these words are found to correspond exactly to those of the German terms *Rauhreif* and *Rauhfrost* which are also their equivalents in present conventional usage. *Subject Headings:* **1. Etymology of rime 2. Italian language.**—*G.T.*

CLOUDS

See also: **Condensation trail forecasting** (Frost), 8.7–140; **Shower clouds in polar airstream** (Mispelblom Beyer, Feteris), 8.7–273.

8.7–268 551.576(213)

Byers, H. R., **Differences between cumulus clouds of tropical and extratropical regions (summary).** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings.* London, Butterworth, **1956.** p. 359. **DWB**—Studies on cumulus clouds in the Caribbean region indicate that cumulus clouds initiate rain in a very high percentage of cases "when they are not more than 2000 m in vertical extent and when the temperature at the top of the cloud is in excess of 5°C." "Tropical cumulus clouds have slower rates of growth than those over the American continent." *Subject Heading:* **1. Tropical clouds.**

8.7–269 551.576.1:778.3

Cloud [over] Irish Sea [and] Northern Malacca Strait. *Marine Observer,* 27(176):81–82, April **1957.** 3 photos. **DLC**—O.W.S. "Weather Explorer" in Irish Sea, April 5, 1956, passing through a cold front moving SW took 2 cloud photos showing lenticular ACu, probably due to lee waves in the air stream passing over Mourne Mts. Photo of Cu cloud on route Singapore-Colombo, April 10, 1956. *Subject Heading:* **1. Cloud photographs.**—*C.E.P.B.*

8.7–270 551.576.1:551.509.1

Rogers, Peter, **Peculiar cloud formation—reply to Mr. Hoddinott.** *Weather,* 9(7):223, July **1954. DWB**—Suggestions on coding unusual cloud phenomena. *Subject Heading:* **1. Synoptic cloud code.**—*C.E.P.B.*

8.7–271 551.576.1

High fog [over] Yellow Sea. *Marine Observer,* 27(176):82–83, April **1957. DWB**—Account of "bridge" of fog about 15 mi long on June 22, 1956. About 300 ft thick and 1 m

ide, tops of masts appeared to touch underside of cloud. Three more arcs were passed later, ss clearly defined and at a greater height. *Subject Headings:* **1. Stratus clouds 2. High fog Yellow Sea.**—*C.E.P.B.*

PRECIPITATION

See also: **Average year's sums of precip., Ger. Fed. Republic,** 8.7–30; **Precip. and soil erosion** (Osborn), 8.7–97; **Correlation between pressure and rainfall, Yugoslavia** (Vujević), 8.7–226; **Rainfall trends, Yugoslavia** (Goldberg), 8.7–234; **Bubbles, saltdust and raindrops** (Woodcock), 8.7–263; **Major floods, 1955,** 8.7 291; **Flood control, Asia and Far East,** 8.7–295; **Weather during winter monsoon, Fukushima Prefecture** (Yamashita, Kasugai), 8.7–317.

8.7–272 551.577:551.574.1

Twomey, S., **Precipitation by direct interception of cloud-water.** *Weather*, 12(4):120–2, April **1957.** 2 photos., table, 2 refs. **DWB**—Reports experiments on cloud-water collection on Mt. Wellington, Tasmania, 4160 ft, using a 6′×3′ wire mesh (8 to 1 in.). Rain gages ere placed under mesh and in open, and read at intervals Feb. 13–21, 1956. Gage under esh recorded 43.99 in., gage in open 4.075 in. Most of difference was due to cloud water. *ubject Headings:* **1. Cloud droplet interception 2. Mt. Wellington, Tasmania.**—*C.E.P.B.*

8.7–273 551.577.11:551.576.12

Mispelblom Beyer, H. A. D. and Feteris, P. J., **A study of shower clouds in a polar airream.** *Weather*, 12(4):115–117, April **1957.** photo, table, 3 refs. **DWB**—On April 6, 956, in a northerly airstream over Holland rising Cu towers were observed with a theodolite op and base) at 30 sec intervals from Warmond near Leiden and appearance of fibrous ructure or reports of hail and thunder noted. Rate of rise of tops 1–3 m/s; height at which ecipitation formed varied. Some clouds produced hail and others snow; some sank again ithout giving precipitation. *Subject Headings:* **1. Precipitation formation 2. Cumulus ouds.**—*C.E.P.B.*

8.7–274 551.577.2/3(438)

Karasiński, Tadeusz (*PIHM, Kraków*), **Opady atmosferyczne w Tatrach.** [Atmospheric ecipitation in the Tatra Mts.] *Przegląd Geofizyczny*, Warsaw, 1(1):15–22, **1956.** 4 tables, refs. **DLC**—Results of a study based on results of observations at 11 meteorological stations the Tatras between 1891–1951. An analysis of mean, monthly and annual precipitation mounts enables the author to present a characteristic of the seasonal features of precipitation stribution which differs depending on the altitude and exposure of the areas to approaching in clouds. *Subject Headings:* **1. Precipitation distribution 2. Precipitation amount 3. Long riod records 4. Tatra Mountains, Poland.**—*A.M.P.*

8.7–275 551.577.3(728.4)

Portig, Wilfried, **Gibt es in den Tropen "Wetter"?** [Is there "weather" in the tropics?] *mschau*, 57(6):168–169, March 15, **1957.** fig., table. **DLC**—Synoptic meteorology was most entirely neglected in the tropics on the grounds that there was no "weather." Even -day textbooks recognize only the dry and rainy seasons. This is an untenable simplification; the rainy season there are often days or series of days without rain, and the amounts, types nd times vary greatly, making forecasting difficult. This is illustrated by San Salvador; the rainiest month, June, rainless days have varied in 1918–55 from 3 to 19. There are so breaks in the dry season. *Subject Headings:* **1. Rainfall variations 2. San Salvador.** —*C.E.P.B.*

8.7–276 551.577.33:517.512.2(44)

Billiet, A., **Existe-t-il une periodicité de 80 ans dans la pluviosité?** [Is there an 80-year infall periodicity?] *La Météorologie*, Paris, Ser. 4, No. 40:313–316, Oct./Dec. **1955.** 3 bles, 2 foot-refs. English and Spanish summaries p. 313. **DWB**—J. Sanson and Carette ade a statistical analysis of precipitation in France since 1513 and found an 80-year periodicity alternating dry and wet periods. Billiet applies a test to that analysis and finds that it

lacks the required level of significance. To confirm this he presents a table construc according to the method used by the authors under review, but based on random figures. this random table an 80-year periodicity also appears, exposing the fallacy of the Sans Carette method. *Subject Headings:* **1. Rainfall periodicities 2. Periodogram analy 3. France.**—*G.T.*

8.7–277 551.577.33(45):517.51

Depietri, Carlo, **Analisi periodale della serie pluviometrica di Modena (1830–195** [Periodogram analysis of the rainfall record of Modena (1830–1954).] *Geofisica e Meteorolog* Genoa, 3(6):140–144, Nov./Dec. **1955.** fig., 26 refs. **DWB**—In a series of 125 annual p cipitation values for Modena, periods of 50, 30, 16.7, 10.4, 8.1, 5.5, 4.1, 2.8, and 2.2 years identified by using VERCELLI's periodogram analysis method. The general trend is constan downward. The periodicities identified are compared with similar periodicities found rainfall records of other stations, in WOLF's relative sunspot numbers and in sunshine reco for Modena. *Subject Headings:* **1. Periodogram analysis 2. Rainfall periodicities 3. Preci tation trends 4. Modena, Italy.**—*Trans. of author's abstract.*

8.7–278 551.577.33:523.7

Troeger, H., **Ein 5- bis 6 jähriger Zyklus der Juli—Niederschläge in Mitteleuropa.** 5–6 year cycle of July rainfall in Central Europe.] *Meteorologische Rundschau*, 10(1):39– Jan./Feb. **1957.** table, 3 refs. **DWB**—July rainfalls above normal at Frankfurt a. 1836–1955 are tabulated in a 5½ year cycle, showing a range from 51 to 101 mm. *Sub Headings:* **1. Rainfall periodicities 2. Sunspot cycles 3. Frankfurt a.M., Germany.**—*C.E.P*

8.7–279 551.577.34(4

Kern, Helmut, **Die Niederschlagsmengen in Bayern seit 1881 in ihrem Verhalten z Mittel 1901–1950.** [Rainfall amounts in Bavaria since 1881 in relation to the mean 1901–5 *Meteorologische Rundschau*, 10(1):31–35, Jan./Feb. **1957.** 3 figs., 3 tables, 8 refs. **DWI** Mean rainfall 1881–1955 (year and April-Sept.) and amounts in extreme years at Bavar stations are compared with 1901–50. Overlapping 10-year amounts are plotted as percenta of 1901–50. *Subject Headings:* **1. Rainfall trends 2. Bavaria, Germany.**—*C.E.P.B.*

8.7–280 551.577.34:51

O'Carroll, F., **Rainfall statistics.** *Weather*, 12(3):97–98, March **1957.** fig., table. **DW** —Referring to G. A. BARNARD's comments (*Weather*, 11(9):273–275, Sept. 1956, *see* 8.2–2 Feb. 1957, *MAB*) on an article by G. REYNOLDS, cumulative residuals of 100 sums of 5 rand numbers are plotted, and show convincing "regimes." The variances however are all simi BARNARD comments. *Subject Headings:* **1. Rainfall trends 2. Statistical analysis.**—*C.E.P*

8.7–281 551.577

Chomicz, Kazimierz, **Deszcze ulewne w Zakopanem.** [Cloudbursts at Zakopan *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 8(3/4):257–263, **1955.** 6 figs., 5 tab 4 refs. French summary p. 262–263. **DWB, DLC**—The interrelation between intensity strong rains in Poland (in general) and their duration is expressed by the formula $U=$ where t is the duration of the rainfall and a and n are the parameters whose values depend the duration. In this paper the author attempts to determine the values of these paramet for the Tatra Mountain territory by taking as a basis rain gage recordings of Zakopane teorological station for the years 1930–1944, and partly for 1945–1951. After having de mined the existence of rainfall maximum (one before dawn, the other in the evening or af noon), he comes to the conclusion that the analytic dependence between the intensity cloudbursts at Zakopane and their duration can be expressed by the formula $Uk=4.8t^{6.5}$ by $U_d=2.8t^{0.5}$ for other persisting rainfalls. *Subject Headings:* **1. Cloudbursts 2. Rain intensities 3. Rainfall duration 4. Zakopane, Poland.**—*A.M.P.*

8.7–282 551.577.37:551.579.4(4

Paxman, D. J., **The exceptional rainfall of July 18th, 1955.** *Dorset Natural History Archaeological Society, Proceedings*, 77:86–89, **1955.** pl., table. Abstracted from reprin

24 hrs 11.00 in. fell at Martinstown, Dorset, the greatest ever recorded in the British Isles a rainfall day. Isohyets show that maximum in center of storm area was probably nearly 2 in. The heaviest rain fell on chalk and there was little flooding. *Subject Headings:* **1. Exptional rainfall 2. Dorset, Eng.**—*C.E.P.B.*

8.7–283 551.577.52

Baier, W., **Niederschlagsmessungen im Walde in Südafrika, 1908/09.** [Rainfall measurements in the forest in S. Africa, 1908/09.] *Meteorologische Rundschau*, 10(1):39, Jan./Feb. 957. table, ref. **DWB**—At Woodbush, 23°50′S, 30°E from Sept. 1908–June 1909, a raingage the forest recorded 106% of one in the open. *Subject Headings:* **1. Forest influences on infall 2. South Africa.**—*C.E.P.B.*

RAIN AND SNOW

See also: **Drought** (U. S. W. B.), 8.7–1, **Airplane rainfall measurement** (Bigg et al.), 8.7–120; **Drop size measurement** (Yeo, Coutts), 8.7–129; **Anti-hail measures, Europe** (Albani), 8.7–141; **Radioactivity in air and precip.** (Garrigue), 8.7–148; **Ablation polygons on snow** (Richardson, Harper), 8.7–258.

8.7–284 551.578.11:551.508.79

Magarvey, R. H. and Taylor, B. W. (*both, Dept. of Physics, Acadia Univ., Wolfville, ova Scotia, Canada*), **Apparatus for the production of large water drops.** *Review of Scientific struments*, Lancaster, Pa., 27(11):944–947, Nov. **1956.** 4 figs., table, 6 refs. **DWB, DLC, GL**—Drop generators are described for the production of streams of drops the equivalent ameters of which are between 0.5 and 20 mm. These generators are based on the principle the interrupted jet described by Lord Rayleigh. An assessment is made of the advantages d disadvantages of drop production based on this principle, and data given showing a high gree of uniformity of drop size. Accurate size control and determination are discussed lative to the execution of experiments designed to measure the physical properties of drops ring free fall. In order to study the instability and breakup of large drops, reasonably ell-formed drops are produced with equivalent diameters that are extremely difficult to oduce by any other method. The behavior of large drops during free fall is concerned with eories of drop size distribution in natural rain. *Subject Headings:* **1. Drop generators Drop properties.**—*Authors' abstract.*

8.7–285 551.578.41:551.509.67

Isono, K.; Komabayasi, M.; Yamanaka, Y. and Fujita, H. (*all, Geophysical Institute, kyo Univ.*), **An experimental investigation of the growth of ice crystals in a super-cooled fog.** *eteorological Society of Japan, Journal*, Ser. 2, 34(3):158–163, June **1956.** 8 figs., 5 refs. s. **DWB, DLC**—An experiment on the growth of ice crystals in a super-cooled fog (−4.4°C) s conducted. The replicas of ice crystals which had fallen on glass slides were measured. e slides were held horizontally and exposed one minute at 50, 100, 200, 500 and 700 m wards of the seeding point. When the seeding was made with a lump of dry ice, ice crystals re produced and grew to columnar form. During about the first 2 min, the crystals grew both directions, i.e., along their principal and lateral axes, but thereafter they grew only ng their principal axes. The rate of increase of the length of columnar crystals was about /sec. The length attained to 550μ in about 5 min, which was observed at the position 700 m wards of the seeding point, while the width of the same crystals remained at about 50μ. e obtained growth rate is compared with that calculated by Houghton. *Subject Headings:* **Ice crystal growth 2. Artificial condensation.**—*Authors' abstract.*

8.7–286 551.578.41

Ôkita, Toshiichi (*Geophysical Inst., Hokkaido Univ.*), **A supplementary note on ice crystal owth.** *Meteorological Society of Japan, Journal*, Ser. 2, 32(9/10):312, Sept./Oct. **1954.** , 2 refs. In English. **DWB, DLC**—Comment on Okita and Kimura's **Ice crystal growth the atmosphere** (*Ibid.*, 32(5), 1954, *see* 6J–256, Oct. 1955, *MAB*) stating that observed owth rates agree better with Houghton theory if values are calculated for "ice spheres" rather an "plates." Fig. 11 of the above article is reproduced with values for plates and spheres

delineated assuming −16°C and −20°C and density of 0.9. It shows that even assuming "spheres," the observed values fall below theoretical especially for times >150 sec. This i thought due to larger crystals having fallen to earth. *Subject Headings:* **1. Ice crystal growth rate. I. Houghton, H. G.**—*M.R.*

8.7–287 551.578.46:621.315.

Hayashi, Kiyoshi; Aiki, Kazuo and Kashimura, Ryoichi, **Some observations on snow accretion of power cable.** *Researches on Snow and Ice*, Tokyo, No. 1:73–80, Nov. 1953 7 figs., 4 refs. In Japanese. **DWB**—To find the meteorological conditions for snow accretion on power cables, observations were made for cables whose diameters are 12 mmφ~36 mmφ Then the functional relation between the density (or the weight) of accreted snow versus scal (or the mean diameter) of accreted snow is discussed. Also the effects of air temperature and wind speed on snow accretion are analyzed, and the results shown in a fig. *Subject Heading* **1. Snow accumulation on cables.**

8.7–288 551.578.46:551.311.128(437

Vrba, Miloš and Urbánek, Bedřich (*Czechoslovak Mountain Service*), **Preliminary result of research on snow and avalanches in Czechoslovakia.** *Journal of Glaciology*, 3(21):72–77 March **1957.** 4 figs., table, 6 refs. English and German summaries p. 72. **DWB**—Change in snow cover in Czech sub-alpine regions occur rapidly—powder snow into firn in 10 days o less—due to migration of water molecules through changes of temperature. G. K. Tushinskiĭ's theory of vapor migration is criticized. Thickness and temperature profiles are drawn for Jan.–April 1954. Avalanche danger is determined by comparing "Daily Measuremen Survey" with typical data on structure and penetration resistance of snow cover in know avalanche situations. *Subject Headings:* **1. Avalanches 2. Snow profiles 3. Czechoslovakia** —*C.E.P.B.*

8.7–289 551.578.4

Vrba, Miloš and Urbánek, Bedřich, **Průběh metamorfosy, diagenese a teploty ve sněhov pokrývce, [Pt. 1].** [Metamorphic, diagenetic and thermal changes in a snow cover, Pt. 1. *Meteorologické Zprváy*, Prague, 7(2):29–35, 1954. 4 figs., 4 graphs, 13 photos, 2 tables, e [Pt. 2] *Ibid.*, 7(5):121–127, **1954.** 4 figs., 7 graphs, 5 refs. Russian and German summarie p. 29, 121. English summary p. 121. **DLC**—Changes in the crystalline structure (meta morphism) and in the stratification (diagenesis) of a snow cover are investigated on the bas of observations made in the Krkonoš Mountains in the winter of 1953/54. Diagrams structural changes in the snow cover and corresponding meteorological conditions are presente as well as photographs of snow crystals in various stages of metamorphism. Methods snow hardness measurement are discussed, including description and illustration of a ramsond used in determining the resistance of the different layers. (For more detailed abstract c Pt. 2, *see* 7G–203, July 1956, *MAB.*) *Subject Headings:* **1. Snow cover properties 2. Krkono Mountains, Czechoslovakia.**—*G.T.*

HYDROMETEOROLOGY

See also: **Third Natl. Hydromet. Conf., Prague** (Hu), 8.7–2; **Met. of flood producing storms, Mississippi River Basin** (Latt, Myers), 8.7–20; **Human adjustment to floods** (White), 8.7–25; **Hydrolog. atlas, Hungary,** 8.7–29; **Infiltrometer studies** (Sato et al.), 8.7–125; **Exceptional rainfall** (Paxman), 8.7–282.

8.7–290 551.579:551.482(234.

Onufrienko, L. G., **Selevye potoki v Karpatakh.** [Flash floods in the Carpathian Mou tains.] *Meteorologiia i Gidrologiia*, Leningrad, No. 6:47, Nov./Dec. **1955. DWB, DLC** A description of flash floods observed in Dec. 1947 and Jan. 1948 in the Lotoritso River on t Belyi Cheremosh and Chernyi Cheremosh River in June 1954, and on the Putile River Cherenomosh Oblast (Ukrainian SSR). Data on water level during the occurrence of t torrents are given. The cause of these flashfloods is attributed to sudden warming leadi to intensive snow melt and to heavy rainfall. *Subject Headings:* **1. Flash floods 2. Ca pathians.**—*I.L.D.*

8.7–291 551.579.4:551.482(73) 551.577.61(73)

Major floods of 1955. *Weatherwise*, Boston, 9(1):16–17, Feb. 1956. fig. **DWB**—Map of U. S. shows specific river basins flooded in New England, the Ohio Basin (March), Calif. and Oregon (Dec.), Washington (Nov.), and several other areas during 1955. The rainfall was ideal for hydrologic purposes in most areas, but hurricane floods in N.E. in Aug. and snow melt and rainfloods in Calif. in Dec. were major disasters involving loss of 254 lives and close to $2 billion property loss. *Subject Headings:* **1. Floods, United States (1955) 2. New England 3. California.**—*M.R.*

8.7–292 551.579.4:551.482

Rakhmanov, V. V., **O prichinakh umen'sheniia rechnogo stoka v nekotorykh raĭonakh SSSR.** [Reasons for decrease of river flow in some regions in the U.S.S.R.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:9–14, Sept./Oct. **1955.** 17 refs. **DWB, DLC**—The author examines the question whether river flow diminishes as a result of increased agricultural exploitation of the land. The author reviews the work of B. V. Poliakov on the decrease of the flow coefficient in Zavolz'he during 1933–36, and the studies of L'vovich and Vendrov in the decline in the flow of the Don and other rivers during 1931–51 as compared with 1882–1930. Data on the flow coefficients of other rivers indicate that climatic changes and not intensified agriculture account for the decreased river flow. The decrease in river flow in Western Europe and in the United States since 1931 is also considered. *Subject Headings:* **1. River flow 2. Climatic variations 3. U.S.S.R.**—*I.L.D.*

8.7–293 551.579.4(672)

*Rodier, Jean (*Electircité de France*), **Études de crues sur les petits bassins versants de l'A.E.F. et du Cameroun.** [Studies of floods in the small basins touching on French Equatorial Africa and Cameroon.] *Annuaire Hydrologique de la France d'Outre-Mer*, 1953, p. 11–14, pub. **1955.** Also: Dubreuil, Pierre, **Études de crues sur un petit bassin de la région de Maroua, Nord-Cameroun.** [Studies of floods in a small basin in the Maroua, North Cameroon region.] *Ibid.*, p. 15–27. figs. Also: Tixier, Jean, **Études de crues sur un petit bassin de la région de Bangui, Oubangui.** [Studies of floods in a small basin in the Bangui, Ubangui region.] *Ibid.*, p. 29–47. figs., tables. Also: French Equatorial Africa. Service Hydrologique, **Étude des petits bassins de l'agglomeration de Brazzaville.** [Study of small basins of the Barazzaville area.] *Ibid.*, p. 49–65. figs., tables. **DWB**—The first paper summarizes hydrologic and meteorologic factors and methods of analysis, whereas the other three (local flood studies) give complete information on terrain, vegetation, equipment of meteorological stations, a climatic summary (temperature, winds, evaporation, pluviometry, hydrology) with data, graphs, charts and analysis. *Subject Headings:* **1. Flood data 2. Local flood studies 3. French Equatorial Africa 4. Cameroons. I. Dubreuil, Pierre II. Tixier, Jean III. French Equatorial Africa. Service Hydrologique.**—*M.R.*

8.7–294 551.579.4

Thams, J. C. (*Locarno-Monti*), **Die Hochwasser vom August und November 1951 am Alpensüdfuss der Schweiz.** [The floods in August and November 1951 south of the Alps in Switzerland.] *Wasser- und Energiewirtschaft*, Zurich, No. 9:3–11, **1952.** 12 figs. (incl. photos), 3 tables.—Actual amounts and deviations from normal precipitation are given for 12 stations, distributed over several catchment areas. A number of blocked cyclones caused the excessive rains. Resulting discharge values are given. Photographs illustrate the damage. *Subject Headings:* **1. Floods 2. Switzerland.**—*A.A.*

8.7–295 551.579.4:551.577.61:551.515.2

United Nations. Economic Commission for Asia and the Far East, **Methods and problems of flood control in Asia and the Far East.** Its *Flood Control Series*, No. 2, pub. Bangkok, **1951.** 45 p. 8 figs. (some fold.), refs. **DWB**—Typhoon rainfall which has been increasing in the past 30 yrs in Japan is discussed and illustrated by a chart showing relation between total annual typhoon rainfall, maximum typhoon rainfall, inundated area, area washed away and buried, expenditure on rehabilitation and on improvement of river beds from 1910–1949, inclusive. The elaborate graph was compiled by the Japanese Ministry of Construction.

Rivers in Japan carry a much greater unit volume of water than those in other parts of East and South Asia—hence they are subject to greater erosion and more sudden flooding. Rainfall-runoff relationships for different kinds of crops are shown graphically and discussed. Rainfall, runoff, silt and erosion data for 18 river stations in U. S., China, India, Burma and Indochina are given. Flood forecasting in most countries is based on river stage observations but in India and Japan the forecast of 24–48 hr rainfall is considered. *Subject Headings:* **1. Flood forecasting 2. Typhoon rainfall damage 3. Flood control 4. Japan 5. India.**—*M.R.*

8.7–296 551.501:551.579.5:551.508.79

Danilin, A. I., **Izmerenie vlazhnosti pochvy po omicheskomu soprotivleniiu ugol'nykh elektrodov v steklovolokne, pomeshchennykh v pochvu.** [Soil moisture measurement by means of the resistance of carbon electrodes in glass wool inserted in the soil.] *Meteorologiia i Gidrologiia*, No. 7:41–44, July **1956.** 4 figs., 8 refs. **DWB, DLC**—The fundamental difficulties inherent in the use of electrical resistance to measure soil moisture content are outlined and various formulas expressing the relationship between soil moisture and electrical resistance are discussed. The development and the use of carbon electrodes in glass wool and the results of soil measurements are described. *Subject Headings:* **1. Soil moisture measurement 2. Carbon electrodes.**—*I.L.D.*

8.7–297 551.579.5

Richards, L. A. (*U. S. Salinity Lab., Riverside, Calif.*), **Retention and transmission of water in soil.** *U. S. Dept. of Agriculture, Yearbook, 1955*:144–151. pub. **1955.** figs. **DA, DWB**—The general subject of soil hydraulics or the physics of moisture movements downward and upward in soil as it dries out or becomes moist through rainfall, flooding or irrigation is described, shown schematically and supported by quantitative data. Types of soil as well as water content are related to porosity and hence to suction gradient. Subsoil moisture and plant cover also affect retention. Curves show change in water content of soil cores of 3 types as suction is increased from zero to 15 atmospheres. *Subject Heading:* **1. Soil moisture retention.**—*M.R.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See: **General climat.** (Gulubov), 8.7–7; **Agric. climat., Valley of Vistula** (Roguski), 8.7–93; **Laws of soil formation** (Ganssen), 8.7–96.

CLIMATE OF PARTICULAR PLACES

See also: **Land use and agro-geographical structure, Bitburg** (Barners), 8.7–17; **Climat. summary, Alert** (Canada. Met. Div.), 8.7–18; **Climate of Eurasian Northlands** (Putnins, Zikeev), 8.7–23; **Hydrolog. atlas, Hungary,** 8.7–29; **Agric. climat., Valley of Vistula** (Roguski), 8.7–93; **Climate and deciduous forests, Ponemah Point, Minn.** (Buell), 8.7–105.

8.7–298 551.582(99)

Feninger, O., **Argentinische Untersuchungen an der antarktischen Kraterinsel Deception.** [Argentine investigations on the Antarctic crater island of Deception.] *Naturwissenschaftliche Rundschau*, 10(4):146–147, April **1957.** 3 figs. **DWB**—Deception (62°58′S, 60°39′W) has been investigated in 1948–50. A few air and ice temperatures are quoted and annual variation of precipitation is given (annual average 300 mm). Humidity is 82–93%. Stratification of water in crater lagoon is shown. *Subject Headings:* **1. Local climates 2. Climate of Deception Island 3. Deception Island, Antarctica.**—*C.E.P.B.*

8.7–299 551.582(97):551.515.8(264)

Lamb, H. H., **Some special features of the climate of St. Helena and the Trade-wind zone in the South Atlantic.** *Meteorological Magazine*, London, 86(1017):73–76, March **1957.** fig., table. **DWB**—Nov. 1954 through Oct. 1955 was cold and wet; monthly rainfalls at 6

stations are shown. Climate of the island is described; cloudiness is due to a good deal of cold front activity in S. Atlantic, often crossing the equator. *Subject Headings:* **1. Climate of St. Helena 2. Fronts 3. St. Helena 4. South Atlantic.**—*C.E.P.B.*

8.7–300 551.582(499)

*Mariolopoulos, Elias G., **Meletē epi tou klimatos tēs Dōdekanēsou.** [Notes on the climate of the Dodecanese.] *Greece. Ethnikon Asteroskopeion Athēnōn, Hypomnēmata, Ser. 2, Meteōrologia*, No. 5, **1956.** 44 p. 15 tables, 28 refs. **DWB**—Monthly mean climatic data for the Dodecanese Islands are presented and discussed. The elements covered are atmospheric temperature, sea temperature, atmospheric humidity, cloudiness, fog, visibility, sunshine, precipitation, pressure and wind. Data for five stations have been used, covering periods up to 15 ys. A general summary of climatic characteristics of the region is included. *Subject Headings:* **1. Local climates 2. Climate of Dodecanese Islands 3. Dodecanese Islands.**—*G.T.*

8.7–301 551.582(495)

*Mariolopoulos, Elias G., **Skiagraphia tou klimatou tōn Athēnōn.** [Outline of the climate of Athens.] *Athens. Panepistēmion. Ergastērion Meteorōlogias, Dēmosieumata*, No. 1, **1956.** 26 p. tables, 4 refs. **DWB**—A table of mean values of climatic elements measured at Athens Observatory during the period 1901–1940 is presented and commented on. It covers atmospheric temperature (average daily, mean maximum and minimum, absolute maximum and minimum), absolute and relative humidity, evaporation, cloudiness, precipitation, wind speed and direction, and number of days with frost, cloud cover, clear sky, rain, snow, hail, dew, rime and storms. All elements are listed in averages for each month of the year and for the whole year. *Subject Headings:* **1. Local climates 2. Climate of Athens 3. Athens, Greece.**—*G.T.*

8.7–302 551.582(569.1)

*Von Bezold, Wolfgang, **Ein Beitrag zur Klimatologie von Damaskus.** [A contribution to the climate of Damascus.] *Meteorologische Rundschau*, 10(1):20–30, Jan./Feb. **1957.** 9 figs., 14 tables, 11 refs. **DWB**—Observations at Damascus, Syria, 8, 14 and 20 h 1931–45, are summarized. Daily means of temperature and pressure are plotted and singularities marked. Monthly means and extremes of temperature and relative humidity, numbers of days outside certain limits, numbers of sultry days, mean and extreme monthly rainfall, days with rain of various amounts, thunder, snow, fog, cloud amount, wind direction and velocity, and pressure are tabulated or plotted. Finally flying weather is discussed. *Subject Headings:* **1. Local climates 2. Climate of Damascus 3. Damascus, Syria.**—*C.E.P.B.*

8.7–303 551.582.2(94)

*Gentilli, J., **Australian climates.** Univ. of Western Australia, **1955.** 18 p. tables. Mimeo.—A fairly analytical discussion, with numerous tables of data, on the climate of Australia as compared with other continents, and on the climates of various geoclimatic regions of Australia. Monsoons, tropical cyclones on 3 coasts, trades, anticyclones, seasons, drought, etc., rainfall variability, humidity, evaporation, cloudiness, winds, temperature and other factors are considered. Year-to-year variability as well as seasonal and monthly regimes are illustrated in tables and discussed. Isolation of Australia from polar and equatorial air masses is emphasized. This plays an important role in extensive deserts and frequent drought. *Subject Headings:* **1. Climate of Australia 2. Climatic regions 3. Australia.**—*M.R.*

CLIMATIC CHANGES

See also: **Weather in Shakespeare's plays** (Brotherton), 8.7–60; **Old moraines, Pangnirtung Pass, Baffin Is.** (Thompson), 8.7–77; **Changing amount of CO_2 in atmos.** (Slocum), 8.7–146.

8.7–304 551.583:550.93:539.16:546.26

Haxel, O., **Geologische und archäologische Datierungen mit C^{14}.** [Geological and archaeological datings with C^{14}.] *Naturwissenschaften*, 44(6):163–169, March 15, **1957.**

5 figs., table, 9 refs. **DWB**—Production of C^{14} from N^{14} by cosmic radiation is described C^{14} is radioactive with a half-life of 5568 years. Method of dating, errors and limitations ar described. Examples of dating are peat in Europe, synchronous temperature variations o Europe and U. S., rise of sea level because of melting of ice, and temperature fluctuations ove 100,000 years shown by foraminifera from deep sea borings. *Subject Heading:* **1. Radiocarbo dating.**—*C.E.P.B.*

8.7–305 551.583.2:551.311.12(797

Harrison, A. E., **Further note on the Nisqually glacier, Mount Rainier, Washington** *Journal of Glaciology*, 3(21):52–53, March **1957. DWB** Some revised figures of shrinkag and advance since 1870 are given. (For abstract on original paper, *see* 7.8–232, Aug. 1956 *MAB*.) *Subject Headings:* **1. Glacier variations 2. Nisqually Glacier, Wash.**—*C.E.P.B.*

8.7–306 551.583.2:551.311.12(786, 797

Johnson, Arthur, **Glacial activity in the western United States.** *Journal of Glaciology* 3(21):50–52, March **1957.** 2 tables. **DWB**—Comments on Professor A. E. HARRISON' paper (*Journal of Glaciology*, 2(19):666–668, 1956; *see* 7.8–232, Aug. 1956, *MAB*). State that a single descriptive term is not applicable to an entire glacier. Cross-profiles of Nisqually Glacier show a thickening of upper part from 1944 through 1951, of middle part in 1949–55 and of lower part not till 1955. Changes of Grinnell Glacier, Montana, in 1945–55 wer insignificant. *Subject Headings:* **1. Glacier variations 2. Western United States.**—*C.E.P.B.*

8.7–307 551.583.2:551.311.12(984

Mellor, M., **Glacier observations in north-west Spitsbergen.** *Journal of Glaciology* 3(21):61–66, March **1957.** 7 figs., table, 6 refs. English and German summaries p. 61 **DWB**—Firn profiles of glaciers in Kongsfjord area 1945/46 to 1954/55 are compared with AHLMANN's, 1924/25–1933/34. Glaciers retreated considerably in 1906–1928 and 1928–1932 but little in 1932–55. *Subject Headings:* **1. Glacier variations 2. Spitsbergen.**—*C.E.P.B.*

MICROCLIMATOLOGY

See also: **Climate of cultivated fields** (Rusin), 8.7–16; **Pollen dispersion and penetration** (Hewson, Dingle), 8.7–102.

8.7–308 551.584.2(426

Garrett, John, **Climatic influences in the Epping district.** *Essex Naturalist*, 29:250–255 **1955.** 4 figs., 2 refs. **DLC**—Description of 130 sq mi of S.W. Essex adjoining London General climatology is followed by an account of microclimatology of forest, slopes, reservoir and built-up area. This is illustrated by temperature traverses and by a cross-section of stand of pollarded hornbeams 30′ high. *Subject Headings:* **1. Local climates 2. Micro climatology 3. Epping, Eng.**—*C.E.P.B.*

8.7–309 551.584.4

Berger-Landefeldt, U; Kiendl, J. and Danneberg, H., **Betrachtungen zur Temperatur und Dampfdruckunruhe über Pflanzenbeständen.** [Temperature and vapor pressure micro variations over plant stands.] *Meteorologische Rundschau*, 10(1):11–20, Jan./Feb. **1957** 15 figs., 8 refs., 11 eqs. **DWB**—Temperature and vapor pressure records were made wit rapid response apparatus on 3 days in 1954 over a lucerne field in Berlin-Dahlem and 2 day in 1955 over a swampy island in Berlin-Wannsee. Means and ranges over 5 min interval are plotted for various heights (42–342 cm at Dahlem, 17–200 cm at Wannsee). Ranges wer greater immediately above plant stands than at greater heights, and greater by day tha night, but increased considerably in disturbed night hours. Range sometimes reached 6°C and 10 mm vapor pressure. Temperature range increased with rising temperature. Vapo pressure range fell to a minimum in the evening. *Subject Headings:* **1. Field microclimatolog 2. Berlin, Ger.**—*C.E.P.B.*

CLIMATIC CLASSIFICATION

8.7–310 551.585(54)

Subrahmanyam, V. P. (*Dept. of Geophysics, Andhra Univ., Waltair*), **Climatic types of India according to the rational classification of Thornthwaite.** *Indian Journal of Meteorology and Geophysics*, 7(3):253–264, July **1956.** 2 figs., 5 tables, 6 refs. **DWB**—Using the climatic data of about 250 stations, the climates of India and the neighborhood are classified according to the 1948 scheme of THORNTHWAITE. The analysis seems to reveal certain features which no previous classification has shown. It is found that most sections of India are more arid than indicated by earlier schemes. The thermal efficiency regime of the country is more than adequate to support forest type of vegetation, limited in maintenance and growth only by the seasonal distribution of rainfall. It is felt that a natural vegetation map of the country is very essential for the validity of the scheme to be verified. *Subject Headings:* **1. Thornthwaite's classification 2. India.**—*Author's abstract.*

BIOCLIMATOLOGY

See also: **Importance of wind speed near the ground to bioclimat. problems** (Zenker), 8.7–98; **Pressure changes and mountain sickness** (Hawickhorst), 8.7–99; **Low pressure effects on animals** (Nakamura et al.), 8.7–100; **Pollen count, Toronto** (Collins-Williams, Best), 8.7–101.

8.7–311 551.586:628.8

Goethe, Sam Paul (*Univ. of Florida*), **What will be the relative humidity?** *Florida. Univ., Gainesville, Engineering and Industrial Experiment Station, Engineering Progress at the Univ.*, 3(4), June **1949,** *Technical Paper Series*, No. 26. 6 p. 11 figs., 2 tables, 3 refs. **DWB**—Reprinted from *Refrigerating Engineering*, N. Y., Feb. **1949.**—Numerous nomograms are developed for calculating the performance of a large air conditioning system operating at a fractional load which differs from design criteria, under conditions such as are found at Gainesville, Fla. Psychrometric and heat gain or removal calculations are paramount. Table gives hourly summer extreme dry and wet bulb temperatures for Gainesville, Fla. Charts comprise one on diurnal march of heat flow through roof and walls of various exposures, respectively, map heat gain versus sun time in extreme day, and several psychrometeric nomograms. *Subject Headings:* **1. Air conditioning calculation charts 2. Heat gain on exposed walls 3. Nomograms.**—*M.R.*

8.7–312 551.586:63(64)

*Grillot, Georges (*Ser. de la Recherche Agronomique, Morocco*), **Le milieu Marocain, aperçu géographique et agricole.** [The Moroccan environment, a geographical and agricultural sketch.] *Morocco. Service de la Recherche Agronomique et de l'Experimentation Agricole, Les Cahiers de la Recherche Agronomique*, No. 2:15–40, **1949.** photos, 4 tables (2 fold.), bibliog. p. 39–40. **DWB**—The general features of the climate of various parts of Morocco as affecting agriculture, are analyzed and a table presented to illustrate conditions in the coldest and hottest years in each section. The natural vegetation, cultivated plants, introduction of new cultures or expansion of cultivation into marginal areas and statistics showing crop yield in several years are also presented. *Subject Headings:* **1. Agricultural climatology 2. Climate of Morocco 3. Morocco.**—*M.R.*

8.7–313 551.586:63:551.501.9

Vernet, A., **Projet d'organisation d'une Section de Bioclimatologie agricole au Centre de Recherches Agronomiques du Maroc.** [Project for the organization of a Section of Agricultural Bioclimatology in the Moroccan Center of Agricultural Research.] *Morocco. Service de la Recherche Agronomique et de l'Experimentation Agricole, Les Cahiers de la Recherche Agronomique*, No. 2:141–159, **1949. DWB**—After defining agricultural bioclimatology and emphasizing the need for bioclimatic research for agriculture to integrate with chemical "soil" and biological studies, a concrete and detailed plan for an agro-bioclimatic research institute and experimental station at Rabat is presented. Similar work done in the U.S.S.R., and work of a dozen or more experts in France and the colonies, is mentioned. Particular needs for

such research in Morocco are pointed out. Field laboratory, statistical and comparative climatological studies are proposed. Among the studies proposed are: (a) effect of dry winds, (b) effect of radiation and light, (c) mountain effect, (d) wind erosion, (e) use of fertilizers with respect to climate, etc. *Subject Headings:* **1. Agrometeorology research 2. Agrobiological research stations 3. Morocco.**—*M.R.*

8.7–314 551.586:631

Steinbach, Hans (*Vienna*), **Über das Fruchten ausländischer Bäume in Wien.** [The fruits of foreign trees in Vienna.] *Wetter und Leben*, 4(9–10):163–165, Dec. **1952. DLC**—The summer of 1952 was unusually warm so that many trees from southern regions produced very large fruit yields. The temperature conditions in June, July and Aug. 1952 are described and the effects of the high temperatures upon the fruit production of various species (for which also temperature sums were calculated) is discussed. A table giving the various fruit trees, their origin and the fruit yield in 1952 and the conditions of the buds for 1953 is included. *Subject Headings:* **1. Phenology 2. Temperature effects 3. Crop yield 4. Vienna, Austria.** —*I.L.D.*

8.7–315 551.586:646(52)

Kudo, T., **Relation between the meteorologic elements and rural life in Iwate Prefecture.** *Iwate Meteorological Equality Corresponding Association, The Review*, Nov. **1951.** p. 12–20. 11 figs., 2 tables, 3 eqs. In Japanese; English summary, abstract section, p. 2–3. **DWB**—The amount of clothes worn by farmers in Iwate Prefecture was studied statistically in connection with sections of the prefecture, temperatures and seasons. It was found that the "number of clothes worn" was greater in the interior than at the seaside, greater in the south than north, and greater in the lee of high mountains than in the passes. One piece of clothing was found to be added for every decrease of 10°C in sensible temperature (5 pieces at −5°C, 6 pieces at −15°C, etc.) *Subject Headings:* **1. Sensible temperatures 2. Weather and clothing 3. Clothing requirements 4. Iwate Prefecture, Japan.**—*M.R.*

ENVIRONMENTAL INFLUENCES

8.7–316 551.588.2

*de Percin, Fernand and Falkowski, Sigmund J., **Topoclimatic study, Fort Churchill, Canada.** *U. S. Quartermaster Corps. Research and Development Command. Environmental Protection Research Div., Technical Report*, EP-38, April **1956.** 28 p. 19 figs. (incl. photos), 3 tables, 8 refs. **DWB**—A topoclimatic study to determine the characteristics of air temperature and wind speed in the vicinity of Fort Churchill, Canada was conducted for 23 days from Jan. 16 to Feb. 7, 1955. Continuous temperature data and wind data were obtained from six stations. The analysis of the data is accompanied by tables and graphs giving daily mean, maximum and minimum temperatures, mean, maximum and mean minimum at each station, frequencies of hourly temperatures, and cumulative frequencies of hourly temperatures, daily mean wind speeds and daily maximum and minimum wind speeds for five stations, etc. Photographs of the stations are presented. *Subject Headings:* **1. Topoclimatology 2. Temperature data 3. Wind data 4. Fort Churchill, Canada.**—*I.L.D.*

SYNOPTIC CLIMATOLOGY

8.7–317 551.589.1:551.515.8(521.16) 551.577.2:551.553.21(52)

Yamashita, H. and Kasugai, T., **Climatological characters in Fukushima Prefecture under the monsoon in winter, (Researches on the weather forecast in Fukushima Prefecture under the monsoon in winter, Pt. 1).** *Journal of Meteorological Research*, Tokyo, 7(9):535–539, Oct. **1955.** 6 figs., 2 refs. In Japanese; English summary p. 535. **DWB, DLC.** Also issued as: *Sendai, Japan. Central Meteorological Observatory, Bulletin of the Society for Research of Tohoku District*, 9(1):13–17, Nov. **1955.** In Japanese; English summary p. 13.—The authors studied the local climate characterized by the distribution of weather, air currents and precipitation in Fukushima Prefecture under the monsoon in winter, and obtained the following results: (1) There are five sources of the air currents (air masses) which flow into Fukushima Prefecture.

(2) The distribution of weather is characterized by the source of air currents, the horizontal divergence or convergence and the topography in the concerned area. The precipitation amount due to monsoon in winter season is much in the western part of the Oou Mountains and very little in the eastern part. *Subject Headings:* **1. Local climates 2. Air mass climatology 3. Monsoon precipitation 4. Fukushima Prefecture, Japan.**—*Authors' abstract.*

MISCELLANEOUS

COSMIC INFLUENCES

See also: **Sun and its influence** (Ellison), 8.7–6; **Between the planets** (Watson), 8.7–13; **IGY meteor program** (Lovell), 8.7–33; **Geophys. obs. during total eclipse of sun** (Cialdea), 8.7–36; **Geomag. obs. during solar eclipses** (Volland), 8.7–164; **Sun's corona** (Blackwell), 8.7–329.

8.7–318 551.590.21:523.74:551.510.535

Relations between the sun and the ionosphere. *Nature*, London, 179(4564):804–806, April 20, **1957. DWB**—Account of Geophysical Discussion at R. Astron. Soc., Feb. 22, 1957. The first part was on "The great solar flare of 1956 Feb. 23," with increase of cosmic rays, radio fade out and other phenomena even on dark side of the earth, indicating a sudden increase of ionization at 80–90 km about 0345 UT. The second part dealt with "The solar cycle variation of the sun's ionizing radiation," separating the background from a slowly varying component from local active centers. *Subject Headings:* **1. Solar flares 2. Radio fading 3. Ionospheric absorption.**—*C.E.P.B.*

8.7–319 551.590.25:541.14:551.510.53

Chapman, Sydney, **Note on persistent meteor trails.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 204–206. 3 refs.) **DWB**—Meteor trails persisting for an hour or more are attributed to some photochemical process in the atmosphere such as a reaction between meteoritic sodium and dissociated oxygen produced by sunlight. *Subject Headings:* **1. Meteor trails 2. Photochemical reactions in upper atmosphere.**—*G.T.*

VISIBILITY

8.7–320 551.591

Slant visibility. *Meteorological Magazine*, London, 86(1017):84–89, March **1957.** 3 refs. **DWB**—Report of a Meteorological Office discussion on Nov. 19, 1956, opened by R. P. W. Lewis and R. Frith. Lewis discussed slant visual range in fog. Patchiness and changing visibility during aircraft's final approach caused greatest difficulties. It is also difficult to translate ground observations of visibility into what the pilot sees. Frith described techniques for measurement of slant visibility (lights carried by tethered balloon, searchlights, flares). A good discussion followed. Burgess (Ministry of Supply) described experiments with a balloon-borne light at Blind Landing Experimental Unit. *Subject Headings:* **1. Slant visibility. I. Lewis, R. P. W. II. Frith, R.**—*C.E.P.B.*

8.7–321 551.591.3(421)

Bonacina, L. C. W. and Carter, C. I., **Summer visibility over London in 1956.** *Weather*, 12(4):123–125, April **1957.** table. **DWB**—Evening visibility from Hampstead May–Aug. 1956 is compared with 1950–55. Countryward visibility was better than townward. *Subject Headings:* **1. Horizontal visibility variations 2. London, Eng.**—*C.E.P.B.*

OPTICAL PHENOMENA

See also: **Optical properties of sea water,** 8.7–31; **Geophys. obs. during total eclipse of sun** (Cialdea), 8.7–36.

8.7–322 551.593.1

Abnormal refraction [in] Tunisian waters, Strait of Gubal, South Pacific Ocean, North Atlantic Ocean, Mozambique Channel. *Marine Observer*, 27(176):83–85, April **1957.** 3 figs.

DLC—A number of examples are described. In 24°24′S, 127°45′W, June 28, 1956, a distorted image of the moon was seen in the sea just before moonrise. June 14, 1956, 32°52′N, 39°22′W, twin suns observed side by side, clearly separated with at first no distortion of either. June 19, 1956, at Lourenço Marques, rising sun took a succession of strange shapes. *Subject Headings:* **1. Refraction phenomena 2. Optical phenomena.**—*C.E.P.B.*

8.7–323 551.593.12:621.396.8:523.8:546.11

Harrower, G. A., **Radio star scintillations and interstellar hydrogen.** *Nature*, London, 179(4560):608 610, March 23, **1957.** 2 figs., 4 refs. **DWB**—Radio signal from Cassiopeia was recorded continuously on 50 Mc/s at Ottawa and examined for scintillation. After removal of altitude effect it showed maximum scintillations at 0300 and 1500–2100 mean solar time, and minor maxima at other times. It is suggested that the cause is interstellar hydrogen captured by the sun's gravitational field and striking the earth's atmosphere. *Subject Headings:* **1. Radio star scintillation 2. Interstellar hydrogen.**—*C.E.P.B.*

8.7–324 551.593.55:535.33:546.33

Barber, D. R., **Photoelectric observations of anomalously polarized twilight emission at 5893 Å.** *Journal of Atmospheric and Terrestrial Physics*, 10(3):172-176, March **1957.** fig., 2 tables, 11 refs. **DWB**—Strongly polarized twilight emission centered on sodium D lines occurred on several occasions following solar flares. The sky background showed decreased polarization. Cause is discussed, but remains unexplained. *Subject Headings:* **1. Twilight spectra 2. Sodium emission.**—*C.E.P.B.*

8.7–325 551.593.55:551.510.534

Gadsden, M., **The colour of the zenith twilight sky: absorption due to ozone.** *Journal of Atmospheric and Terrestrial Physics*, 10(3):176-180, March **1957.** 4 figs., 3 tables, 15 refs. **DWB**—Observations with a colorimeter in London and Sussex gave variations of chromaticity as a function of solar depression θ. Chromaticity was also computed for $\theta = 1°$, 3° and 6° taking account of absorption by 0.303 and 0.248 cm ozone, with good agreement in accord with theory of E. O. Hulbert. That for $\theta > 6.5$ most of the light from the zenith sky is due to secondary or higher orders of scattering is supported by the maximum of blueness. *Subject Headings:* **1. Twilight sky color 2. Ozone absorption.**—*C.E.P.B.*

8.7–326 551.593.55

Rozenberg, G. V.; Khvostikov, I. A. and Iudalevich, F. F., **Vliianie mnogokratnogo rasseianiia sveta na iarkost' sumerechnogo neba.** [Influence of multiple diffraction of light on the brightness of the twilight sky.] *Akademiia Nauk SSSR, Doklady*, N. S., 59(7):1277-1279, March **1948.** table, 6 refs. **DLC**—The twilight method of investigating upper atmospheric layers, introduced by V. G. Fesenkov, led to the successful application of indirect methods of study of the stratosphere. The rapid change of the sky's brightness at the time of the sinking of the sun below the horizon, caused by the gradual entering of higher atmospheric layers into the earth's shadow, makes possible a layer-by-layer investigation of the atmosphere by the photometric method. The very complicated theory takes into account the effect of the primary scattering only and does not give any method for calculating the influence of multiple scattering. The calculation of the portion of brightness determined by secondary scattering as made in 1938 by E. O. Hulburt and confirmed by him in 1947 is incorrect. This portion remains sufficiently small at any moment of twilight. It is also shown that the twilight method can be applied to the investigation of the atmosphere up to the highest layers (200-250 km). *Subject Headings:* **1. Twilight sky brightness 2. Light diffusion 3. Multiple diffusion of twilight.**—*A.M.P.*

8.7–327 551.593.55:551.521.3

Shtaude, N. M., **O vliianii rasseianiia vtorogo poriadka na iarkost' sumerek v zenite.** [Influence of second degree scattering on the brightness of the zenith twilight.] *Akademiia Nauk SSSR, Doklady*, N. S., 59(7):1281–1282, **1948.** 2 figs., table, 4 refs. **DLC**—In connection with E. O. Hulburt's findings and his assertion of the rapid growth of the influence of secondary scattering on the brightness of zenith twilight, the author introduces a method

of finding the minimum values of secondary scattering. The results, presented in a table, show for the "twilight atmosphere" a very smooth course of relationship of first and second degree of scattering which is smaller than a unit even at 100° zenith distance from the sun. A control calculation made for the isothermic stratosphere is shown on the right side of the table. The result is close to HULBURT's findings in case of sun sinking well below the horizon but it is much below in case where sun does not sink so low. Author concludes that the great increase of the effect of second order scattering is not a general property of the atmosphere, but only of such atmosphere which has very small densities and low pressure at great heights. *Subject Headings:* **1. Twilight sky brightness 2. Secondary scattering 3. Zenith twilight.** —*A.M.P.*

8.7–328 551.593.55

Sky coloration [in] South Pacific Ocean. *Marine Observer*, 27(176):86, April **1957.** fig. **DLC**—At sunset, April 6, 1956, 27°5′S, 133°38′W, a wedge of deep blue, almost purple sky passed sharply into light blue on either side. *Subject Heading:* **1. Twilight phenomena.** —*C.E.P.B.*

8.7–329 551.593.7:523.75:523.78

Blackwell, D. E., **A study of the outer corona from a high altitude aircraft at the eclipse of 1954 June 30.** *Royal Astronomical Society, Monthly Notices*, 115(6):629 649, **1955.** 12 figs., 8 tables, 12 refs. **DWB**—Photographs from an aircraft at 30,000 ft gave values of coronal brightness to a distance of 13½° from the sun. Coronal isophotes have a spiked structure on each side along solar equator. Polarization of the corona is discussed. Variation of brightness of corona with distance from the sun (1–10°) is continuous with variation of zodiacal light (30–100° from sun). *Subject Headings:* **1. Sun's corona 2. Solar eclipses.** —*C.E.P.B.*

ELECTRICAL PHENOMENA

See also: **Radioactivity in houses, Sweden** (Hultqvist), 8.7–19; **Geophys. obs. during total eclipse of sun** (Cialdea), 8.7–36; **Calculation of charge density** (Shmoys, Karp), 8.7–163; **Auroral ionization** (Kaiser), 8.7–341.

8.7–330 551.594.12:551.510.41:551.509.58

Gilbert, G. H., **Fall-out from large nuclear explosions with applications to civil defence. *Canada.*** *Defence Research Board, ORG Memorandum*, No. 55/6, March 6, **1955.** 18 p. 6 figs., 3 charts, 4 tables, 5 refs. **DWB**—Many aspects of atomic or nuclear fallout, prediction of patterns and intensities, and protective measures against radiation hazards are covered in this series of notes and diagrams for use in Canada. Some of the subjects covered are formation of nuclear cloud, fallout from a particular level, time of arrival, variation of wind with altitude, wind aloft data for Canada (5 stations for 4 seasons) up to 80,000 ft, prediction of patterns from synoptic charts and supplementary nomograms and, finally, a U. S. Atomic Energy Commission report on hazards of fallout, etc. *Subject Headings:* **1. Radioactive fallout pattern forecasting 2. Upper air winds 3. Canada.**—*M.R.*

8.7–331 551.594.14:551.508.9

De Maio, Arturo (*Istituto Univ. Navale, Naples*), **Su la misura della radioattività atmosferica con un metodo moderno.** [Measurement of atmospheric radioactivity with a modern method.] *Geofisica e Meteorologia*, Genoa, 4(3):37–38, May/June **1956.** table, ref. **DWB**—G. ALIBERTI's method of natural radioactivity measurement (flux method) is compared with the filter paper method and the two techniques are found to give practically identical results. The Millipore filter is found to be superior to Whatman No. 4. *Subject Heading:* **1. Radioactive content measurement.**—*G.T.*

8.7–332 551.594.22

Abnormal lightning [in] South Pacific Ocean. *Marine Observer*, 27(176):80, April **1957.** fig. **DLC**—May 11, 1956, in 19°28′S, 127°56′W, four flashes of greeny-blue light behind low-

lying Cu were followed by wedges of dark-red light rising slowly from behind the cloud. *Subject Heading:* **1. Lightning discharges.**—*C.E.P.B.*

8.7–333 551.594.221:621.316.9

Williams, M. O., **Lightning protection.** *Automatic Telephone Electricity, London, Journal,* 12(1):65–74, Jan. **1956.** 12 figs. **GB-MO**—Recent research into the nature of lightning discharges is summarized, including wave shapes of current surges, severity and probability of flashes, and travelling waves induced in telephone wires. The "Atmite" protector for telephone wires is described and illustrated. *Subject Heading:* **1. Lightning protection.**—*C.E.P.B.*

8.7–334 551.594.223

Gerasimenko, T. F., **Sharovaia molniîa vo vremia zimneĭ grozy.** [Ball lightning during a winter thunderstorm.] *Priroda,* Moscow, No. 7:109–110, July **1956. DWB, DLC**—The appearance of 3 cases of ball lightning, which originated after a blinding flash of forked lightning during a heavy thunderstorm (which is very unusual in winter) which took place at 5:15 a.m. Dec. 9, 1955 at Maikod (North Caucasus), is described. The 3 cases appeared simultaneously in 3 neighboring houses and were seen by the residents. One ball divided in two after having moved along the wiring and reached an electric meter which was destroyed and produced a severe explosion in the house. A strong specific odor of some kind of pungent gas was noticed in all 3 houses: while this smell could have been partly explained by the burning of rubber insulation of lead in two houses, the same odor was noted in the 3rd house where no electric wires had been damaged. *Subject Headings:* **1. Ball lightning 2. Winter thunderstorms 3. Northern Caucasus.**—*A.M.P.*

AURORAS

See also: **IGY aurora program** (Chapman), 8.7–35.

8.7–335 551.594.5 551.521.326

Chapman, Sydney, **Achievements and prospects in auroral and airglow research.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 1–8. 6 refs.) **DWB**—As an introduction to a symposium on aurora and airglow, the author reviews the history and problems of auroral research, namely those connected with the auroral zone, the height of auroras, their spectrum, morphology, connections with other phenomena, etc. Problems of research on airglow, zodiacal light and escape of atmospheric gases are also mentioned. *Subject Headings:* **1. Auroral research 2. Night airglow.**—*G.T.*

8.7–336 551.594.5

Garstang, R. H. (*Univ. of London Observatory*), **Transition probabilities of auroral lines.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 324–327. 2 tables, 11 refs., eqs.) **DWB**—T.P. values are tabulated for the 2 p^3 configuration of the forbidden lines of OII and NI, and also for the auroral line, 5577Å. It is pointed out that the most probable value for the latter is about 25% smaller than that based on an s_q value derived from a self-consistent field with exchange, viz. 1.0 $sec^{-1} \pm 0.2$. For the ions, OII and NI, transition probabilities for the $^2P - {}^4S$, $^2P - {}^2D$ and $^2D - {}^4S$ lines may be in error by ±20%, ±40% and ±50%, respectively. *Subject Headings:* **1. Auroral spectra 2. Forbidden N lines.** —*Physics Abstracts, No. 9144, 1956.*

8.7–337 551.594.5

Störmer, Carl, **Auroral activity during April–December 1956.** *Nature,* London, 179(4560): 623, March 23, **1957. DWB**—Increasing auroral activity during 1956, followed increasing sunspot numbers. Displays of April 21–22, Oct. 26–27, Nov. 14–15 and Nov. 22–23 are described and heights given. *Subject Headings:* **1. Auroral descriptions 2. Auroral heights.** —*C.E.P.B.*

8.7–338 551.594.51:546.291

Dalgarno, A. and McDowell, M. R. C. (*Dept. of Applied Math., Queen's Univ., Belfast*), **Simultaneous excitation and ionization of helium by electron and proton impact.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 340–345. 3 tables, 10 refs., 30 eqs.) **DWB**—Using BORN's approximation, cross-sections have been calculated for the processes $e+He \rightarrow e+He^+(nl)+e$ and $H^+ + He \rightarrow H^+ + He^+(nl)+e$ for nl, any of $2p$, $3p$, $4p$, $3d$, and $4d$. *Subject Headings:* **1. Auroral physics 2. Helium.**—*Authors' abstract.*

8.7–339 551.594.51

Fan, C. Y. (*Yerkes Obs., Univ. of Chicago*), **Laboratory studies of auroral excitation.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 276–282. 4 figs. (incl. photos), 7 refs.) **DWB**—This paper summarizes results of laboratory experiments on the interactions of air with electrons (10–8000 eV), protons (5–350 keV), and He^+ ions (10–450 keV). With low-energy protons and He^+ ions as exciting particles, hydrogen and helium emissions, produced by the process of charge exchange, can always be detected. The charge exchange process plays such an important role that the relative intensities of the negative and the Meinel systems of N_2^+ in an ionic impact spectrum are significantly different from those excited by electrons. Various questions related to auroral excitation are also discussed. *Subject Heading:* **1. Auroral energy excitation mechanism.**—*Author's abstract.*

8.7–340 551.594.51:535.33

Gribbon, P. W. F. and Stewart, D. T. (*both, Physics Dept., Queen's Univ., Belfast*), **The laboratory excitation of auroral infra-red O I lines.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 287–288. fig. (photo), 5 refs.) **DWB**—The auroral infra-red [O I] lines λλ7774 and 8446 have been produced, using controlled electron beams at low pressures. The observed intensity ratio is in agreement with the auroral ratio. It is suggested that these lines originate by simultaneous excitation and dissociation of O_2 molecules following single-electron impact. *Subject Heading:* **1. Auroral spectra.**—*Authors' abstract.*

8.7–341 551.594.51:551.594.12:551.501.8

Kaiser, T. R. (*Dept. of Physics, Univ. of Reading, Berks*), **Radio investigations of aurorae and related phenomena.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 156–173. 8 figs., table, 41 refs., eqs.) **DWB**—The paper discusses in some detail the characteristics of auroral ionization as revealed by metre wavelength radio-echo observations in the auroral and subauroral regions. A close association between the radio-echoes, visual auroras, magnetic activity, and radio-star scintillations is revealed. A similar correspondence appears to exist between low-frequency auroral-type echoes and scintillations in the minauroral region, although these show some marked differences from the high-latitude phenomena. Some suggestions are made for future lines of work, particularly during the International Geophysical Year, 1957–58. *Subject Headings:* **1. Auroral ionization 2. Radio echoes from auroras.**—*Author's abstract.*

8.7–342 551.594.51:551.521.9

Lebedinskii, A. I. (*Univ. of Moscow*), **Electrical discharges and the interpretation of auroral types.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 222–224. fig., 3 refs., 5 eqs.) **DWB**—Discharge theories of auroral arcs and of auroral rays are presented, and numerical estimates of the characteristics of the discharges are made. *Subject Headings:* **1. Auroral theories 2. Auroral emissions.**—*Author's abstract.*

8.7–343 535.33:546.17

Lofthus, Alf, **Emission band spectra of nitrogen.** *Canadian Journal of Physics*, Ottawa, 34(8):780–789, Aug. **1956.** 3 figs., 7 tables, 10 refs., 5 foot-refs. **DWB, DLC**—The near ultraviolet part of the emission spectrum of nitrogen has been photographed under high resolution. Thirteen bands of the $a^1\Pi_g - X^1\Sigma_g^+$ system (Lyman-Birge-Hopfield) have been

analyzed and new vibrational and rotational constants obtained. Combining the observed data with those obtained by STOICHEFF from the Raman spectrum of nitrogen, refined equilibrium constants for the ground state were obtained. The predissociation in the $a^1\Pi_g$ state was observed. *Subject Heading:* **1. Nitrogen bands.**—*Author's abstract.*

8.7–344 551.594.51

McCarroll, R. J. and Wakely, P. G. (*both, Dept. of Applied Math., Queen's Univ., Belfast*) **Transition probabilities for some lines of N II.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 337–339. 3 tables, 11 refs., 2 eqs.) **DWB**—Hartree-Fock wave-functions have been obtained for the $(3d)\ ^3P$, $(3d)\ ^3D$, $(3d)\ ^3F$, $(3p)\ ^3P$ and $(3p)\ ^3L$ terms of N II, and from these wave-functions various transition probabilities have been computed, using both the dipole-length and dipole-velocity form of the transition integral. The two forms give satisfactory agreement and provide a basis on which to estimate the validity of the Coulomb approximation of BATES and DANGAARD. *Subject Heading:* **1. Auroral physics.**—*Authors' abstract.*

RADIO METEOROLOGY

See: **Measurement of ionospheric path-phase** (Price, Green), 8.7–160.

PART II. SELECTIVE ANNOTATED

BIBLIOGRAPHY ON ALBEDO

By: *Sigmund Fritz* and *Malcolm Rigby*

INTRODUCTION

The albedo or reflectivity of natural objects enters the realm of a wide variety of sciences. Meteorologists are interested in all phases of the subject. The albedo of the planet Earth is of interest to astronomers. The albedo of snow and ice affects their heat budgets and glaciologists concern themselves with this problem. The albedo of forests and ground is of agricultural interest; hydrologists interested in water supply and run-off study these problems. Scientists studying problems in visibility and vision deal with the albedo of snow surfaces and clouds; it would be easy to extend the list.

In many cases the albedo is mainly dependent on the scattering properties of the medium; this is especially true of the albedo of clouds and of the clear or dusty atmosphere. In other cases specular reflection is dominant, as over a smooth, calm water surface. Often the specular reflection ideas may be applied to rougher surfaces as in the case of the wind-roughened sea surface.

The development of the theoretical and empirical treatment of the albedo of clouds is revealed in this bibliography. SCHUSTER (8G–1) studied the emission of energy from a star. He considered the energy inside the star to be diffuse and applied a diffusion equation to his problem. This essentially assumed that the diffuse energy consisted of two streams flowing in opposite directions; one stream flowed towards the outer boundary of the star, the other away from the boundary.

In later years, this "two-stream" diffusion theory was applied to the reflectivity of a cloud irradiated by a solar beam, even though the solar beam is not a diffuse energy source (e.g., 6, 8, 21, 54, 69). Recognizing this, many of the "two-stream" theorists assumed that their results applied when the sun's zenith distance, Z, was 67°, although then a factor of sec Z was often omitted as WHIPPLE (discussion of 54) pointed out. WHIPPLE suggested that a six stream theory be used and CHU and CHURCHILL (204) did use a six stream approximation. The exact equation of energy transfer (73) can perhaps be applied; but then the form of the scattering pattern must be approximated by a complicated expression and the mathematical computations will become very complex. FEIGEL'SON (81) did use an energy transfer equation, and approximated the scattering pattern of a spherical water drop by a three term expression. This however does not give enough forward scatter; thus too much energy moves in an upward direction and the computed albedo is too high. Another method (124) involves tracing the solar beam through thin cloud layers of finite thickness until the energy does become diffuse; then a diffusion equation is applied to the diffuse energy.

The "two-stream" method does not yield the variation of albedo with solar zenith distance, but the other methods mentioned above, show a marked variation with Z, especially for relatively thin clouds. All of the theoretical results are for overcast sky conditions; and with a few exceptions the computations assume homogeneous clouds. The elimination of these assumptions will doubtless be attempted in the future.

The computations reveal that the cloud albedo can vary almost over the whole range from zero to 100 percent, especially when absorption is negligible. Measurements (e.g., 5, 69, 74, 84) verify this. Thus it is not possible to choose a single cloud albedo measurement as representative of the world-wide time and space average of cloud albedo. Nevertheless this was done (ALDRICH 1919) and the cloud albedo of 0.78 was used as an average value with which to compute the albedo of the planet Earth. The resulting albedo of the Earth was 0.43 and despite its questionable basis, this value still persists in the literature. Various other estimates of the planet's albedo have been made on the basis of meteorological observations before and after 1919. But observations of the moon afford another method of estimating the Earth's albedo (e.g. 4, 32, 205) which integrates in a single measurement the meteorological factors for a large section of the Earth. These measurements have used visible light and DANJON's average value for the visible albedo was 0.39. Since the sun's infrared radiation is more strongly absorbed by the Earth's atmosphere, the albedo in total sunlight should be smaller than 0.39, and it was found (67) that 0.35 was the Earth's albedo after allowance for these spectral effects had been included. (See also 123.)

The proposed artificial satellite measurements should add much towards establishing the average albedo and to our knowledge about the space and time variations of the Earth's albedo.

The albedo of many other natural objects have been measured or computed. References will be found in this bibliography to albedo studies of snow, ice, grass, fields, forests, leaves, water, oceans, lakes, rivers, bays, etc. Measurements have been made in various portions of the spectrum and Krinov (59) has made particularly comprehensive measurements. References and sources to albedo of snow and ice are documented in Vol. 7, No. 7, July 1956 of this periodical, and further references will be found in the *SIPRE Bibliography* (211) and in the current abstracts section [Part I] of *MAB*, under Radiation [551.521], or may be located in the subject indexes under **Albedo** or **Albedo of . . . .**

Although the accurate observational measurement of albedo did not begin until after the turn of the 19th–20th century, the idea of, and many careful attempts to measure the albedo of the planets, the moon, water, fields, forests, etc., existed from the time when Bouguer first developed his photometer in 1725 (178). Lambert extended the work, including the theory (179); Bond at Harvard College in 1860 (180) made detailed measurements with a camera to obtain the "chemical albedo," which differed from the "visual albedo" because of the effect of intensified spectral reflectivity in regions which had greater or lesser effect on the photographic plates. The first observations of clouds from above were made at Mt. Wilson in 1906 (183) and by balloon at Mt. Wilson in 1918 (184). Notable work by Russian scientists may be found summarized in the books by Kalitin (38), Krinov (59) and theoretical applications to the radiative balance of the earth and atmosphere in Kondrat'ev [8G–132] and others. These historical and a few recent works that have just been located will be found in chronological order in the supplementary section [p. 991].

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BIBLIOGRAPHY ON ALBEDO

1729–1904

(*See Supplementary Material, p. 991*)

1905–1907

8G–1 551.521

Schuster, Arthur, **Radiation through a foggy atmosphere.** *Astrophysical Journal,* 21(1):1–22, **1905.** 6 figs., 4 tables, 2 refs., 20 eqs. **DWB**—An investigation into the relation of bright and dark lines in stellar spectra to the absorption and scattering coefficients of the stellar media. Equations and theory appropriate for diffuse energy source from interior of star are derived. Shows that transmission, or presence of bright or dark bands depends on absorption coefficient, scattering coefficient and temperature gradient in star. Does not discuss albedo, but author's theory was later used by several investigators as a basis for terrestrial cloud albedo computations. *Subject Headings:* **1. Two-stream theory 2. Transmission 3. Stellar spectra 4. Albedo computations**—*S.F.*

8G–2 551.578.46:551.521

Savinov, S., **O taianii snega.** [On snow melting.] *Meteorologicheskiĭ Vestnik,* Leningrad, 17:117–123, 153–162, **1907.** 5 tables. **DWB**—Influence of solar radiation and air temperatures on rate of snow melt was experimentally investigated during the spring of 1905. Albedo of samples of dense snow was about 57–58%. One part of sample was covered by soot. Measurements showed that amount of solar radiation absorbed by snow reached 0.34 cal/min (in pure snow) and 0.83 cal/min in soot covered snow. (*Same item as* 7G–31, July 1956, *MAB.*) *Subject Headings:* **1. Radiation properties of snow cover 2. Snow melt 3. Albedo of snow.**—*N. T. Zikeev.*

1916–1919

8G–3 551.508.21 551.521.14:551.578.46

Abbot, Charles G. and Aldrich, L. B., **The pyranometer: an instrument for measuring sky radiation.** *Smithsonian Miscellaneous Collections,* Wash., D. C., 66(7), May **1916.** 9 p. 2 figs 2 tables. **DLC**—The instrument described, based on K. ÅNGSTRÖM's pyrheliometer and pyrgeometer is used to measure the energy of radiation to or from a complete hemisphere lying above the measuring surface. It was tested by numerous measurements of radiation from the sun, sun and sky, sky alone, and from newly fallen snow, and gave results very near those obtained with a pyrheliometer when corrected to vertical incidence. Albedo of snow for sun and sky radiation combined was found to be 70% (winter of 1915–16). (*Same item as* 7G–37, July 1956, *MAB.*) *Subject Headings:* **1. Pyranometers 2. Albedo of new snow 3. Washington, D. C.**—*M.R.*

8G–4 551.521.14:523.2

*Russell, H. N., **On the albedo of the planets and their satellites.** *Astrophysical Journal,* 43(3):173–196, April **1916.** 5 tables, 16 refs., 7 eqs. **DWB**—A useful discussion of the meaning of the albedo of a planet is given. The computed albedo depends on the law of reflection assumed; a formula which depends only on the observed variation of brightness with phase is given. The brightness of earth shine, i.e. the light reflected from earth to moon and back to earth, is given from

observation by VERY. The albedo of the moon and the planets is given. The visual albedo of the earth is given as 0.43 to 0.45 on the basis of VERY's visual observations of the earthshine. An earth albedo of 0.22 is listed based on spectrograms. The photographic albedo of the earth (wavelength near 4,200 Å) is 0.6. *Subject Headings:* **1. Albedo of earth 2. Albedo of planets 3. Earthshine on moon.**—*S.F.*

8G–5 551.521.14

*Luckiesh, M., **Aerial photometry.** *Astrophysical Journal*, 49:108–130, **1919.** 3 figs., 3 tables, 7 refs. **DWB**—An important source of photometric measurements obtained in the vicinity of Langley Field, Virginia from airplane. Measurements are mainly vertically downward. Reflection factor averages (percent) are: fields 6.8, for clouds, the factors vary from 78 for very dense clouds of great depth to 36 for thin clouds. The influence of haze is measured, and sky brightness as a function of height is given. The reflection factors for various types of water are measured: shallow water in Hampton Roads, 7.4, Chesapeake Bay (deep) 4.9, Atlantic Ocean, 3.5, yellow, muddied river, 20, some lakes very dark. Data for summer and autumn. *Subject Headings:* **1. Albedo measurements 2. Albedo of clouds 3. Albedo of earth's surface 4. Albedo of water 5. Langley Field, Virginia.** —*S.F.*

1921–1923

8G–6 551.521.14:551.576

Mecke, R., **Über Zerstreuung und Beugung des Lichtes durch Nebel und Wolken.** [The scattering and diffraction of light by fog and clouds.] *Annalen der Physik*, 65:257–273, **1921.** 4 figs., table, 12 refs., 16 eqs. **DWB**—By means of two-stream theory, assuming sun in zenith and scattering coefficient the same for direct and scattered radiation, author computes first transmission and reflection of light by clouds in absence of absorption. Shows graphical results for several values of scattering coefficient. Relates values to visibility. For large droplet clouds transmission is given as 0.77 for "optical thickness" about 3, where scattered radiation is said to reach a maximum. The equations including absorption are then solved for albedo and transmission. The effects of diffraction are considered next in relation to optical phenomena such as glories. *Subject Headings:* **1. Albedo of clouds 2. Two-stream theory 3. Atmospheric absorption 4. Diffraction.**—*S.F.*

8G–7 551.521:551.578.4(494)

*Dorno, C., **Fortschritte in Strahlungsmessungen.** [Progress in radiation measurement.] *Meteorologische Zeitschrift*, 39(10):303–323, Oct. **1922.** fig., 6 tables, refs. **DLC**—In this extensive review of radiation measurements at Davos Nov. 1920–June 1922, the long wave, visible and UV radiation balance is discussed and tables of data (both illustrative and summarized) are presented. It was found that at high elevations where the ground is covered with snow for 5 months a year, only $\frac{1}{3}$ of the incoming radiation goes toward warming the air, whereas at sea-level the reverse is true (60% is converted into heat). Albedo of snow was found to increase gradually from 0.72 in the UV to 0.94 in the yellow (based on 5 days of records) using a cadmium cell, and from 0.622 to 0.770 using Ångström's pyranometer. Measurements were made over old, but frost covered snow. (*Same item as* 7G–42, July 1956, *MAB.*) *Subject Headings:* **1. Radiation data 2. Albedo of snow 3. Davos, Switzerland.**—*M.R.*

8G–8 551.521.14:551.576

Dietzius, Robert, **Die Absorption des Lichtes in trüben Medien, insbesondere Nebel und Wolken.** [Absorption of light in turbid media, especially in fog and clouds.] *Beiträge zur Physik der freien Atmosphäre*, 11:69–74, **1923.** 4 refs., 19 eqs. **DWB**—By means of two-stream theory the albedo and absorption in clouds are computed as function of cloud thickness, surface albedo, wave length of light and cloud parameters. In visible light absorption is small and albedo, W, of infinitely thick clouds is about 0.9 in cloud where $2\pi r^2 N = 10^{-3}$. For infrared, albedo drops markedly while absorption in cloud increases. For $\lambda = 1.4\mu$, $W = 0.38$; for $\lambda = 1.7$, $W = 0.27$; for $\lambda = 2.5\mu$, $W = 0.1$. Computations for a few values of cloud thickness are also given. *Subject Headings:* **1. Two-stream theory 2. Albedo of clouds 3. Visible and infrared absorption 4. Transmission.**—*S.F.*

1925–1929

8G–9 551.521.14:551.578.46

*Ångström, Anders, **The albedo of various surfaces of ground.** *Geografiska Annaler*, Stockholm, 7:323–342, **1925.** 6 figs., 9 tables, 8 refs., 6 eqs. **DWB**—With a pyranometer and filters, the albedo of grass, wet and dry ground, trees, sand, snow and water surfaces were measured. Dry fresh grass had albedo of 0.25 to 0.33 for total sunlight, but 0.45 for red and near infrared, suggesting a value of 0.1 to 0.2 for visible light. Wet grassfields albedo decreases to 0.22; albedo of snow several days old in Alps was .695; albedo of fresh snow in Stockholm was 0.81. Dry sand albedo is 0.18; this drops to 0.09 for wet sand. Decrease is attributed to multiple reflections within thin layers of water.

Measurements of water surface from a pier show albedo for diffuse sky light about 0.1. Albedo for direct solar beam follows Fresnel's reflection law closely, although measured values are consistently higher; difference is within limits of probable error in a single measurement. For sun and sky, albedo is 3.9% for solar altitude, h, 47° and increases to 46.5% for $h = 5.5°$. Transmission and absorption by leaves is given. (*Same item as* 7G–44, July 1956, *MAB.*) *Subject Headings:* **1. Albedo measurements 2. Albedo of ground surfaces 3. Albedo of snow 4. Albedo of water surfaces 5. Sweden.**—*S.F.*

8G–10 551.578.46:551.521.14

*Götz, F. W. Paul, **Strahlungsklima von Arosa.** [Radiation climate of Arosa.] Berlin, Julius Springer, **1926.** 110 p. 31 figs., 69 tables, refs. p. 107–110. **DWB**—On p. 72–83 of this classic on mountain climatology, the available data on illumination from above and from the horizon in different directions and different cloud and snow cover conditions is analyzed for various spectral regions including the UV and for various angles of elevation and for several places (Arosa, Chur and Hörnligrat, the latter at 2500 m). The surface illumination or "unterlicht" is then analyzed for Arosa (Dec. 1923–Sept. 1924) showing variations in albedo from 1.00 with fresh snow to 0.31 for almost melted snow (in May). [The high values of albedo may be a matter of definition.] Albedo in blue and UV is also discussed along with measurements of penetration of light into the snow cover. (*Same item as* 5G–5, July 1954, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Snow transparency 3. Daylight illumination 4. Arosa, Switzerland.**—*M.R.*

8G–11 551.508.92:551.521.14

*Richardson, Lewis Fry, **Report on photometers for a survey of the reflectivity of the earth's surface.** I.U.G.G., Section of Meteorology, Third General Assembly, Prague 1927. Cambridge, University Press, **1928.** 18 p. 5 figs., tables, 6 refs. **DWB**—Describes photometer which visually matches brightness of wedge illuminated by sky and ground. Gives theory of calibration. Calculates scatter by atmosphere. Fraction of energy reflected upward by 1 cm of air is 1.58×10^{-6} for green light and 0.75×10^{-6} for red. Albedos of various fields, woods, etc. given for blue, green and red light. Values range from 0.02 to 0.25. *Subject Headings:* **1. Albedo of earth 2. Spectral albedo 3. Photometers.**—*S.F.*

8G–12 551.578.46:551.521.61/3

Hulburt, E. O., **The ultraviolet, visible and infrared reflectivities of snow, sand and other substances.** *Optical Society of America, Journal,* 17:23–25, July **1928. DLC**—The laboratory measurements were made in the spectral region of λ0.3 to 7μ by thermocouples and a quartz mercury lamp. It was found that the diffuse reflecting power of snow is 2–4 times higher than sand, and contains much more ultraviolet radiation. (*Same item as* 7G–48, July 1956, *MAB.*) *Subject Headings:* **1. Ultraviolet reflection from snow 2. Albedo of snow.**—*N. T. Zikeev.*

8G–13 551.521.14:551.575:551.510.42

Regener, Erich, **Messungen der Albedo an künstlichen Nebelschichten.** [Measurement of albedo on artificial fog layers.] *Zeitschrift für Physikalische Chemie,* Leipzig, Abt. A, 139:416–424, **1928.** fig., foot-refs. **DLC** (QD1.Z45)—Instrumentation for measuring albedo of artificial fog under controlled laboratory conditions is described. Very dense fogs of SO_3, of paraffin, and of ammonia were found to have albedo values near unity if their surface is sharply defined (held down by a carbon dioxide layer). If there are diffuse particles at the surface of SO_3 fogs their albedo is similar to that of natural clouds. *Subject Heading:* **1. Albedo of artificial fog.**—*G.T.*

8G–14 551.521.14

*Kalitin, N. N., **Al'bedo zemnoĭ poverkhnosti.** [Albedo of the earth's surface.] *Meteorologicheskiĭ Vestnik,* Leningrad, 39(9/12):224–232, Sept./Dec. **1929.** 3 figs., 6 tables, 3 foot-refs. **DLC**—An Ångström pyranometer (illustrated) was used at Slutsk from Feb. 16 to May 29, 1929, to measure the albedo of snow cover and the ground after snow melted (on April 23). The results are discussed in great detail and tabulated separately for each type of surface. It is shown that the maximum albedo of snow cover (87%) occurred on March 11 when the freshly fallen snow was blindingly brilliant. The albedo of grass cover was 20.8% on the average with maximum of 33.9% after a heavy rain. Albedos of bare ground vary from 10 to 33% depending on the type of soil (maximum in chalky soils). Such variations of albedo have a strong influence on the turbulence of the lowest air layers. (*Same item as* 7G–50, July 1956, *MAB.*) *Subject Headings:* **1. Albedo data 2. Slutsk, U.S.S.R.**—*A.M.P., M.R.*

8G–15 551.521.14:535.243

Shull, Charles A., **A spectrophotometric study of reflection of light from leaf surfaces.** *Botanical Gazette,* Chicago, 87(5):583–607, June **1929.** 10 figs., 8 tables, 7 refs. **DLC**—Data on reflection of

light (wave lengths from 430 to 700 mμ) from the surfaces of several dozen different leaves were obtained by means of a spectrophotometer and are tabulated and graphically presented. Reflection from green leaves is found to be greatest at wave lengths between 540 and 560 mμ (6–8% for the darkest and 20–25% for the lightest green leaves), while the reflection curves usually show a depression at 680 mμ, which corresponds to the maximum absorption band of chlorophyll. Albedo of autumn leaves, of leaves covered with mildew, etc., is also discussed. *Subject Headings:* **1. Albedo of leaves 2. Spectrophotometric study of light reflection.**—*G.T.*

1930

8G–16 551.578.46:551.521.14

*Kalitin, Nikolaĭ N., **The measurements of the albedo of a snow cover.** *Monthly Weather Review*, Wash., D. C., 58:59–61, **1930.** 2 figs., tables, 2 refs. **DWB**—Values of snow albedo (near Leningrad) varying from 0.87 to 0.46. High values associated with fresh snow, lower values with thawing and older snow. After snow vanished, ground albedo was 0.19 rising to 0.23 as grass appeared. Gives results for wet and dry grass for sunny and overcast conditions. (*Same item as* 7G–52, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Albedo measurements 3. Leningrad, U.S.S.R.**—*S.F.*

8G–17 551.521.14:551.507.352

*Richardson, Lewis F., **The reflectivity of woodland, fields and suburbs between London and St. Albans.** *Royal Meteorological Society, Quarterly Journal*, 56(233):31–38, **1930.** 5 tables, footrefs. **DLC**—Aerial measurements of reflectivity from different surfaces under cloudy sky were made with a photometer using red, green and blue lenses. Both the original data and those corrected for opalescence of the air and for zenith angle are tabulated. The surfaces measured include woods, green fields, bare land, a water reservoir and residential areas. *Subject Headings:* **1. Albedo of terrain types 2. Airplane observation of albedo 3. England.**—*G.T.*

1931

8G–18 551.501:551.521.14

Ångström, Anders, **Der Einfluss der Bodenoberfläche auf das Lichtklima.** [The influence of earth's surface on light climate.] *Beiträge zur Geophysik*, Leipzig, 34:123–130, **1931.** 3 refs., 2 eqs. **DWB**—Because of the multiple reflections (of transmitted light) between the ground and the overlying atmosphere, the total downcoming energy J_{rd}, increases as the albedo, r, of the ground increases. The downward inherent reflectivity of the clear atmosphere, d, is taken as 0.25. For $r=0.1$, $J_{rd}=1.025J$, where J is the energy reaching a horizontal ground when $r=0$. When $r=0.7$, as with snow cover, $J_{rd}=1.21J$ for clear skies. For overcast skies, the reflectivity of the cloud base is taken as 0.75; $J_{rd}=1.08J$ for $r=0.1$ and $J_{rd}=2.1J$ for $r=0.7$ under overcast conditions. For ultraviolet light, with clear skies and $r=0.7$, $J_{rd}=1.54J$ because of the greater reflectivity of the overlying atmosphere for shorter wave radiation. The significance of these results for health resorts and vertical windows is discussed. (*Same item as* 7G–54, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Albedo of earth 3. Illumination climatology 4. Transmission.**—*S.F.*

8G–19 551.508.2

Kalitin, Nikolaĭ N., **A field albedometer.** *Monthly Weather Review*, 59:118, **1931.** 3 figs. **DWB**—Describes a portable pyranometer mounted in a Cardan's suspension so that receiving surface is horizontal. Provision for turning pyranometer facing up or down, and mounting on a long rod to permit albedo measurements. *Subject Heading:* **1. Albedometers.**—*S.F.*

8G–20 551.578.46:551.521

*Kalitin, N. N., **Opyt izucheniia radiatsionnykh svoĭstv snegovogo pokrova.** [Radiation properties of a snow cover.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Izvestiia*, No. 1/2:9–18, **1931.** 4 figs., 5 tables, refs. English summary p. 18. Also German version as: **Die Strahlungseigenschaften der Schneedecke.** *Beiträge zur Geophysik*, 34:354–366, **1931.** 6 figs., 4 tables. **DLC**—Radiation penetration into a snow cover was measured in Slutsk near Leningrad (winter 1930/31) by means of a pyranometer buried under the snow and a second one placed on the snow surface. The installation of instruments is shown in photographs. Detailed tables contain the measured values of cloudiness, solar angle, albedo of the snow surface, thickness of snow cover, radiation received and absorbed at the snow surface, radiation passing through the cover, snow surface temperature, air temperature and state of snow. Radiation penetration into snow is also graphically represented. Radiant energy penetration through a snow cover 5 cm thick is found to be 8% of the radiation received and 40% of the radiation absorbed by the snow surface. For a 10 cm cover the penetration is 2.4% and 20%. (*Same item as* 7H–16, Aug. 1956, *MAB.*) *Subject Headings:* **1. Radiation penetration in snow 2. Pyranometers 3 Albedo of snow 4. Slutsk, U.S.S.R.**—*G.T.*

1933

8G–21 551.521.14:551.576

*Albrecht, F., **Theoretische Untersuchungen über den Strahlungsumsatz in Wolken.** [Theoretical research on the radiation process in clouds.] *Meteorologische Zeitschrift*, 50:478–486, Dec. **1933.** 4 figs., 2 tables, 5 refs., 12 eqs. **DWB**—The effect of sun's zenith distance, z, as it affects back-scatter by a particle only is incorporated into two-stream theory; but computations are carried out only for $z = 67°$, and for drop diameter $2r = 2.5$ to 10μ and liquid water content 0.2 to 5.0 gm/m^3. Transmission as related to wavelength, λ, is given. For $\lambda > 0.82\mu$, the fraction of the total transmitted light varies from 16.4% to 45.1%. The absorption in clouds (water vapor neglected) is 0.85% for total liquid water content in cloud of 0.004 gms and $2r = 2.5\mu$; it is 2.84% for 0.1 gm and $2r = 10\mu$. The distribution of absorption with depth in cloud is given in terms of temperature rise; the largest rise is 0.03° C/min. at a depth of about 10 m. The cooling rate of the cloud in the region 0 to 10 m is much larger, reaching 5°C/min. (sic) (corresp. to outgoing radiation of 0.200 cal/cm^2 min.) near the cloud top. The possible significance for cloud structure is briefly discussed. *Subject Headings:* **1. Two-stream theory 2. Albedo of clouds 3. Atmospheric absorption 4. Sun's zenith distance.**—*S.F.*

8G–22 551.521.14:551.583.3

Wundt, W., **Änderungen der Erdalbedo während der Eiszeit.** [Variations in the earth's albedo during the glacial period.] *Meteorologische Zeitschrift*, 50(7):241–250, July **1933.** 4 figs., 30 refs. **DWB**—The secondary effect of increased reflection of solar radiation by snow fields will enhance whatever primary effect may cause ice ages. The global magnitude of this secondary effect is estimated by dividing hemispheric maps for the ice age and for the present time into light, medium and dark areas and also accounting for cloudiness conditions. It is found that the earth's albedo during the ice age was 3.9% higher in the Northern Hemisphere and 2.3% higher in the Southern Hemisphere than it is now (the Southern Hemisphere has a higher value of cloudiness). This corresponds to an average global temperature decrease of 4°C during the climax of the ice age. This value is in agreement with those obtained by other authors by different methods. It is further estimated that the disappearance of the present permanent snow and ice fields would (due to decrease of albedo) cause a 4.8°C increase of world temperature. (*Same item as* 7G–61, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of earth 2. Ice Ages.**—*G.T.*

1934

8G–23 551.578.46:551.521.14

*Bogdanovich, G. P., **Osveshchennost' rasseiannym svetom razlichno orientirovannykh vertikal'nykh poverkhnosteĭ pri bezoblachnom nebe.** [Illumination by scattered light of differently oriented vertical surfaces in cases with clear sky.] *Zhurnal Geofiziki*, Moscow, 4:407–420, **1934.** 5 figs., 7 tables, 3 refs. German summary p. 419–420. **DLC**—Illumination measurements made by the Institute of Actinometry and Atmospheric Optics in Slutsk proved that vertical illumination may be twice as high from snow cover as from vegetation cover. Increase of snow cover brightness with sun altitude had more influence on the illumination of vertical surfaces than that on horizontal ones. (*Same item as* 7G–62, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Illumination over snow cover 3. Slutsk, U.S.S.R.**—*N.T. Zikeev.*

8G–24 551.521.14

Sharonov, V., **O kharakteristikakh otrazhatel'noĭ sposobnosti nebesnykh tel.** [Characteristics of reflectivity of celestial bodies.] *Astronomicheskiĭ Zhurnal*, 11(5):473–483, **1934.** fig., table, 13 refs., 19 eqs. English summary p. 483. **DLC** (QB1.A47)—Definitions of various concepts of reflectivity are given. "Brightness coefficient" is defined as the relation of the angular brightness of a diffusing surface to the amount of illumination of that surface. Connections between "brightness coefficient" and "albedo" (not angular) are treated mathematically, and a concept of "mean brightness coefficient" is introduced. *Subject Headings:* **1. Albedo of celestial bodies 2. Brightness coefficient.**—*G.T.*

8G–25 551.521.14:551.507.352

Sharonov, V. V. and Sytinskaia, N. N., **Opyt aerofotometricheskogo opredeleniia koefitsientov rasseivaniia zemnoĭ poverkhnosti po metodu odnovremennykh izmerenii iarkosti i osveshchennosti.** [Attempt at aerophotometric determination of the coefficient of reflectivity of the earth's surface by the method of simultaneous measurement of brightness and illumination.] *Zhurnal Geofiziki*, 4(7):40–45, **1934.** tables, foot-ref., eqs. English summary p. 45. **DLC** (QC801.Z52)—Brightness of meadows, field, woods, sandy tracts, forest roads and open dry roads was measured from a tethered balloon at the same time as the illumination was measured with a simultaneously calibrated photom-

eter from the ground. The method was intended as a check on other methods of reflectivity (albedo) measurements from airplanes. Data are given *in extenso*. Work was done in Aug. 1930 during sunny weather. Details of operations are included. *Subject Headings:* **1. Airplane observation of albedo 2. Albedo of terrain types 3. U.S.S.R.**—*M.R.*

1935

8G–26 551.578.46:551.521.14

*Chudakov, P. A., **Nekotorye dannye po izmereniiu dnevnoĭ osveshchennosti.** [Some results of daylight illumination measurements.] *Zhurnal Tekhnicheskoĭ Fiziki*, Moscow, 5:174–175, **1935.** fig., 2 tables. **DLC**—Snow cover is an important factor in illumination. Measurements made during April–Dec. 1933 in Mytishchi (near Moscow) showed that in the presence of snow cover, illumination increased considerably. Mean illumination by direct sunlight in Aug. was 4.3 phot. and in Nov., after establishment of snow cover, increased up to 5.05 phot. Scattered light illumination showed the same relationship. (*Same item as* 7G 66, July 1956, *M.A.B.*) *Subject Headings:* **1. Albedo of snow 2. Illumination over snow cover 3. Mytishchi, U.S.S.R.**—*N. T. Zikeev.*

8G–27 551.578.46:551.521.14

*Devaux, Joseph, **Étude de l'albedo de la neige dans le spectre infra-rouge.** [Study of spectral albedo of snow in the infrared.] *Académie des Sciences, Paris, Comptes Rendus*, 200(1):80–81, Jan. 2, **1935.** foot-ref. **DLC**—Observations of the albedo of snow compared with that of a known diffuser (quartz) at Pic du Midi Observatory (2860 m) on April 17, 1934, near noon of a clear day, show the following values:

Wave length = 0.6μ	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
Diffusion factor = 0.67	0.61	0.55	0.34	0.40	0.18	0.21	0.08	0.01

Minima at 1.0 and 1.2μ correspond to absorption bands of H_2O or ice. (*Same item as* 7G–67, July 1956, *M.A.B.*) *Subject Headings:* **1. Albedo of snow in infrared 2. Spectral albedo of snow 3. Pic du Midi, France.**—*M.R.*

8G–28 551.521.14:523.4

*Krinov, E. L., **Opyt izucheniia spektral'noĭ otrazhatel'noĭ sposobnosti Marsa i Iupitera.** [Preliminary investigation of the spectral reflectivity of Mars and Jupiter.] *Astronomicheskiĭ Zhurnal*, Moscow, 12(6):557–563, **1935.** 5 figs., 3 tables. English summary p. 563. **DLC** (QB1.A47)—Slitless spectrograms (from 400 to 651 mμ) of Jupiter and Mars were compared to those of α Aurigae exposed at the same zenith angle. Assuming that the observed spectrum of α Aurigae is identical with the solar spectrum the relative values of the quantities $r\lambda = I\lambda_p/I\lambda^*$ were determined, $I\lambda_p$ being the intensity of the spectrum of the planet at a given λ, and $I\lambda^*$ that of the star's spectrum at the same wave length. The final values of $r\lambda$ are given in two tables. They show that the reflectivity of the red portions on the disc of Mars resembles that of red sandstone. *Subject Headings:* **1. Albedo of planets 2. Solar spectrum.**—*Author's abstract.*

8G–29 551.521.14:629.13

Sharonov, V. V., **Fotometricheskie nabliudeniia so stratostata i ikh zadachi.** [Photometric observations from a stratostat and their object.] (In: Vsesoiuznaia Konferentsiia po Izucheniiu Stratosfery, Leningrad, 1934, **Trudy,** pub. **1935.** p. 211–215. 11 refs.) **DLC** (QC879.V8 1934). Trans. into English in its **Proceedings of the All-Union Conference for the Study of the Stratosphere,** pub. **1938,** p. 133–137.—Experience with photometric observations from airplanes is used as a guide in outlining possible instruments, methods and results of observations of visibility brightness and albedo of the earth's surface, clouds or atmosphere from very high altitudes approximating conditions which could be observed from beyond the atmosphere. From observations of the earth's shine on the moon, RUSSELL obtained a value of 0.45 for the albedo of the earth, while RAMANATHAN figured 0.46. Direct methods are necessary to verify these values. Results would also be useful in comparing the atmosphere of the earth and of the planets Venus and Mars. *Subject Headings:* **1. Photometry from stratostat 2. Albedo observation from stratosphere 3. Airplane observation of albedo.**—*M.R.*

8G–30 551.578.46:551.311.18:551.521.14

*†Trofimov, A., **Podlednaia i podvodnaia osveshchennost' v verkhnikh gorizontakh moria.** [Illumination of the upper layers of an ice-covered sea.] *Zhurnal Geofiziki*, Moscow, 5:444–465, **1935.** 7 figs., map, 8 tables, 62 refs. **DLC**—In the presence of snow cover, the ice in the Arctic seas absorbed the major portion of light. Transparency of 1 m ice varied from 3% to 37%, depending

on thickness and albedo of snow cover. *Subject Headings:* **1. Snow cover influences 2. Albedo of ice 3. Arctic Ocean.**—*N. T. Zikeev.*

1936

8G–31 551.521.14:551.578.46:551.521.32

Chernigovskiĭ, N. T., **Neskol'ko opytov nad radiatsionnymi svoĭstvami snega i l'da Karskogo moria u o-va Uedineniia v 1935 g.** [Some experiments on the radiation properties of the snow cover and the ice of the Kara Sea carried out at Uedineniia Island in 1935.] *Arctica*, Leningrad, 4:137–142, **1936.** photo., 2 tables, foot-refs. **DLC**—Observations were made 100 m from the shore of Uedineniia Is. (77°30′24″N, 82°12′12″E) from March 31 to July 7, 1935, to determine the albedo of snow 15–20 cm thick which covered the ice during this period. It was not possible to have a completely overcast sky when measurements were made. Average albedo varied from 89% on April 4 to 58% on July 7 (wet dirty snow). Single observations varied from 94% in April to 52% in July. Penetration measurements showed 10% at 5 cm depth (March 21) when sun was 7°–11° height and albedo 87%. On June 24 with sun 19°–30° height, and albedo 64%, 23–30% penetrated 10 cm of snow. The amount of radiation retained is also given. It is stated that absorption in the upper layers of sea ice increases as the ice decomposes, thus increasing the rate of melting (*Same item as* 7H–26, Aug. 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Radiation penetration in snow 3. Uedineniia Island, U.S.S.R**—*M.R.*

8G–32 551.521.14

*Danjon, André, **Nouvelle recherches sur la photométrie de la lumière cendrée et l'albedo de la terre.** [New researches on the photometry of the light from the dark side of the moon and the albedo of the earth.] *Strasbourg. Université. Institut de Physique du Globe, Annales, New Ser., Pt. 3, Geophysique*, 3:139–180, **1936.** 12 figs., tables, refs., eqs. **DNO**—From photometric measurements of the dark and light sides of the moon, the albedo of the earth is calculated for blue, green and red light. The visual albedo of the earth is 0.39 (annual average for years 1926–1934); albedo is 0.59 in blue light. Gives color index of earthshine. The albedo varies from 0.3 (Aug.) to 0.5 (Oct.) because of meteorological effects. Gives daily and annual values of brightness of earthshine from which corresponding earth albedo can be calculated. *Subject Headings:* **1. Photometry 2. Albedo of earth (lunar) 3. Spectral albedo measurements 4. Seasonal albedo variations 5. France.**—*S.F.*

8G–33 551.521.14:551.578.46:551.521.31

Kalitin, N. N., **O velichinakh rasseiannoĭ radiatsii atmosfery v Arktike.** [Amount of diffuse atmospheric radiation in the Arctic.] *Arctica*, Leningrad, 4:121–135, **1936.** 6 figs., 2 tables, foot-refs. English summary p. 135. **DLC**—Diffuse radiation is high in the Arctic because of the great cloudiness and high albedo of the constant snow cover—hence very little radiation is retained at the surface. Values of diffuse radiation under varying cloud cover at 6 Arctic stations are tabulated (observations were made from 1932–1935). These values are higher than any recorded in more southerly latitudes. At Mastyr at the mouth of the Lena, 523 cal/sq cm of diffuse radiation was received on May 21, 1933 and 541 on May 22. (*Same item as* 7H–27, Aug. 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Albedo effects on diffuse radiation 3. Diffuse radiation in Arctic 4. Mastyr, Siberia 5. Soviet Arctic.**—*M.R.*

8G–34 551.578.46:551.521.14

Middleton, W. E. Knowles, **Yellow appearance of distant snow fields.** *American Meteorological Society, Bulletin*, 17:365, Dec. **1936. DWB**—Optical and reflective properties of snow cover are analyzed on the basis of observations made by A. Heim (Luft-Farben, Zurich, 1912) in Alps. Yellowish or bluish colors appeared to be dependent on cloudiness. (*Same item as* 7G–69, July 1956, *MAB.*) *Subject Headings:* **1. Optical properties of snow 2. Albedo of snow 3. Yellow snow fields 4. Alps.**—*N. T. Zikeev.*

8G–35 551.578.46:551.521.14

*Olsson, Hilding, **Radiation measurements on Isachsen's Plateau.** *Geografiska Annaler*, Stockholm, 18(3/4):225–244, **1936.** 4 figs., 5 tables, 16 refs. **DLC**—Radiation measurements were made by the Norwegian-Swedish Arctic Expeditions during their stay on Isachsen's Plateau (June 26–Aug. 15, 1934). Data on: 1) duration of sunshine, 2) total radiation from sun and sky, 3) albedo of the snow surface and 4) absorption of radiation in snow are tabulated and discussed. Average snow albedo values ranged from 81 to 59 with clear and from 75 to 65 with cloudy sky, for new snow and melted snow surface, respectively (detailed values are given). The radiation received at the snow surface is reduced to half its value at 6–8 cm and to 10–20% at 20 cm below the surface. (*Same item as* 7G–70, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Snow transparency 3. Radiation in Arctic 4. Isachsen's Plateau, West Spitsbergen.**—*G.T.*

1937

8G–36 551.521.14:551.463

*Kalitin, N. N., **Ob izuchenii spektral'nogo al'bedo vodnoĭ poverkhnosti.** [Study of the spectral albedo of water surfaces.] *Meteorologiia i Gidrologiia*, No. 9:92–94, **1937.** 3 figs., 2 tables. **DLC** (QC851.M27)—Report on work done by the author in the spring of 1937 at Yalta, to obtain albedo of water surfaces in 5 spectral regions (UV, blue, green, red and infrared). Curves show average, maximum and minimum values for 4000 to 6600 Å. Values are as follows (%):

	UV	B	G	R	IR
Mean	5	19	20	16	5
Max	8	28	29	23	8
Min	4	9	10	9	2

Subject Headings: **1. Albedo of sea surface 2. Spectral albedo of water 3. Yalta, U.S.S.R.**—*M.R.*

8G–37 551.521.14

Penndorf, R. **Die Albedo der Erde.** [Earth's albedo.] *Meteorologische Zeitschrift*, 54(9):348–349, Sept. **1937.** fig., 7 refs. **DWB**—Danjon (1936) measured the albedo of the earth by earthshine measurements (see 8G–32). In this paper the albedo variations obtained by Danjon are discussed in their possible relation to meteorological factors, especially cloudiness and snow cover. *Subject Heading:* **1. Albedo of earth.**—*G.T.*

1938

8G–38 551.521.14:551.578.46

*†Kalitin, Nikolaĭ Nikolaevich, **Aktinometriia.** [Actinometry.] Leningrad, Gidromet. Izdat., **1938.** 324 p. 161 figs., 147 tables, 141 refs. **DLC**—Ch. 12 of this unique text on actinometry and radiation deals with reflection, absorption and penetration of solar radiation from water, clouds, snow, ice, sand, soil and leafy plants under various conditions. Total albedo, albedo in various spectral regions, at various solar angles, at various depths in snow or in water or ice, and for various types of trees are discussed and the discussion supported by extensive data obtained by the author and by others over many years. Consequent variations in penetration or absorption of radiation by the ice, snow or water at various depths are indicated in a quantitative manner in tables and graphs. (*Same item as* 6B–23, Feb. 1955, *MAB.*) *Subject Headings:* **1. Solar radiation 2. Albedo data 3. Slutsk, U.S.S.R.**—*M.R.*

8G–39 551.578.46:551.521.14

*Kalitin, N. N., **Spektral'noe al'bedo snegovogo pokrova.** [Spectral albedo of snow cover.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. i Geofiz.*, No. 2/3:153–163, **1938.** 9 figs., 4 tables, 6 refs. **DLC**—Albedo of new snow is very high (97%) in the UV and infrared, the spectral albedo is 91% and 88%, and when compacted through melting falls to 70% or less, and when the surface becomes granular through further melting, the albedo falls even lower (46%–67%). Actual spectral albedo measurements in 5 regions, and overall albedo recorded on many days in Feb.–April 1937 at Slutsk with a special spectral albedo meter (described, illustrated and spectral characteristics shown graphically) are presented in tables and graphs for various types and amounts of snow cover. With a snow cover of 0.8, the albedo at 5500 Å (green) was 50%, but with 0.2 cover only 26% and with no cover (old dry grass) 17% and green grass 15%. (*Same item as* 7G–76, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Spectral albedo of snow 3. U.S.S.R.**—*M.R.*

8G–40 551.578.4:551.521.14:535.61

Sauberer, Franz, **Versuche über spektrale Messungen der Strahlungseigenschaften von Schnee und Eis mit Photoelementen.** [Spectral measurements, with photoelements, of the radiative properties of snow and ice.] *Meteorologische Zeitschrift*, Brunswick, 55(6):250–255, June **1938.** Tables, 10 refs. **DLC**—The author's measurements made at Lunz Biological Station in 1935 and 1936 with Lange selenium photocells and using filters in the range from 360 to 820 mμ were useless as they gave albedo values of >100% due to internal reflection. The measurements made in 1937/1938 gave somewhat better results, indicating very little difference between wave lengths (72% to 76%) in the average. Highest value obtained was 84% for new snow and an overcast sky. These compare with values of 75% to 88% obtained by other authors. The spectral penetrability is also given for the different wave lengths at a depth of 7 cm with a water content of 0.9 cm. Range of values was from 79% at 380 Å to 100% at 5000 Å and 95% at 7600 Å. Absorption coefficient was found to be 0.150, compared with Thams' value of 0.083 obtained with a Graukeil. Values ranged from 0.110 for new snow and 0.290 for old wet snow, and a maximum of 0.320. (*Same item as* 7G–78, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Radiation properties of snow 3. Spectral reflectivity.**—*M.R.*

1939

8G–41 551.578.46(494):551.521.1

*Bader, Henri; Haefeli, R.; Bucher, E.; Eckel, O. and Thams, Chr., **Der Schnee und sein Metamorphose.** [Snow and its metamorphism.] *Beiträge zur Geologie der Schweiz, Geotechnisch Serie, Hydrologie*, No. 3, **1939.** 350 p. figs., tables, 18 plates (some fold.). **DLC.** Translation into English issued as *U. S. Snow, Ice and Permafrost Research Establishment, Translation*, No. 14 Jan. **1954.** 313 p. figs., tables, bibliog. p. 302–303.—In Ch. V of this most comprehensive work on all aspects of snow and snow physics, the density, temperature and radiation of the Davos snow cover are discussed by O. Eckel and Chr. Thams. Pt. VII on the **Radiation properties of snow cover** gives data for the several elements of the radiative balance—the instrumentation and observational procedures, etc. Sec. B takes up measurements of reflection and transmission: theory, methods of measurement (pyranometer, solarimeters and albedometers). Examples of records are reproduced and photos show instruments in field. Results of data obtained in winter 1936–37 and 1937–38 are shown graphically and in tables, and are discussed at length. Effect of time of day, wave length (380 to 760ν), weather, clouds, etc. is shown. Daily totals of energy absorbed by snow cover are based on albedo measurements quoted. *Subject Headings:* **1. Snow mechanics 2. Snow physics 3. Albedo of snow 4. Translations 5. Weissfluhjoch, Switzerland 6. Davos, Switzerland. I. Van Tienhoven, Jan C.** (*trans.*).—*M.R.*

8G–42 551.521.14:551.578.4

*Chernigovskiĭ, N. T., **O radiatsionnykh svoĭstvakh snegovogo pokrova i l'da moreĭ.** [Radiative properties of snow cover and of sea ice.] *Problemy Arktiki*, No. 6:31–38, **1939.** 8 tables, 9 refs. **DLC**—To determine the snow and ice albedo, experiments were made on Uedineniia Island in 1938 by V. I. Sokol'skiĭ; Tiksi Bay in 1937 by M. M. Kopylov; Cape Schmidt in 1936–1937 by M. A. Kuznetzov, and Tikhaia (Calm) Bay (Franz Josef Land) in 1936 by G. V. Biurganovskaia. Mean monthly snow and ice albedo for these are given in tables, which show that the mean monthly snow albedo of the Arctic varies little with latitude during March (87%), April (86–88%) and May (83–84%). Only the southernmost point, Tiksi Bay, shows 80% during May. Snow albedo decreases in June to 70%, in July to 50%. The mean annual variations of ice albedo differ from snow albedo; during spring ice albedo is about 40% in April, 45% in May–June and 50% in July. It increases during Aug. and Sept. to 50–60%. Methods of experimentation are discussed. (*Same item as* 5I–86, Sept. 1954, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Albedo of ice 3. Seasonal albedo variations 4. Soviet Arctic.**—*M. W. Snow.*

8G–43 551.521.14:551.578.4

Kuz'min, P. P., **Radiatsiia otrazhennaia ot poverkhnosti moria i pogloshchennaia sloiami vody razlichnoĭ glubiny.** [Radiation reflected from the sea surface and absorbed by water layers at various depths.] *Meteorologiia i Gidrologiia*, 5(7):3–11, **1939.** illus., tables. **DLC**—Values of sea ice and snow albedo obtained in Kandalaksha Bay, White Sea (1937 and 1938) are tabulated with specification of type of surface, time of day, height of the sun and amount of radiation. Albedo amounts between 30% for dirty thawing snow and 95% for pure snow were obtained. (*Same item as* 7H–33, Aug. 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Albedo of ice 3. Kandalaksha Bay, White Sea.**—*G.T.*

1940

8G–44 551.52

†*Albrecht, Fritz, **Untersuchungen über den Wärmehaushalt der Erdoberfläche in verschiedener Klimagebieten.** [Investigations on heat economy of the earth's surface in different climatic regions.] *Germany. Reichsamt für Wetterdienst, Wissenschaftliche Abhandlungen*, Vol. 8, No. 2, Berlin **1940.** 80+ p. 39 figs., 17 tables, 70 refs. **DLC**—A classical treatise on the energy exchange of the continents and oceans, based on the detailed studies made at a number of places up to the beginning of World War II: Atlantic and Indian Oceans, Florida Straits, Soviet Arctic, Potsdam, Sodankylä (Finland), Irkutsk, the Gobi, Batavia and Eismitte (Greenland) by Wüst, Bonicke, Helland Hansen, Sverdrup, Malmgren, Mosby, Defant, Ångström, Keränen, Haude, Albrecht, Büerema, Georgi, K. Wegener, Sprung, W. Schmidt, Wild and Lunelund. Data on salinity and temperature (for oceans), and radiation, percentage of sunshine, vapor pressure, wind velocity, evaporation, rainfall, etc., for land and sea are given in elaborate tables and graphs for each climatic area where such data are available. Values of albedo over various surfaces by Ångström and Büttner are used as a basis for determining the outgoing radiation. In addition to the many systematically presented graphs and tables, there is an excellent bibliography and much carefully worked out theoretical development of the problems of land and sea radiation balance. (*Same item as* 8–66, Aug. 1950, *MAB.*) *Subject Headings:* **1. Global energy exchange 2. Albedo.**—*M.R.*

8G–45 535.61:523.51

*Krinov, E. L., **Spektrofotometricheskoe izuchenie 40 kamennykh meteoritov.** [Spectrophotometric study of 40 stony meteorites.] *Astronomicheskii Zhurnal*, 17(4):40–64, **1940.** 7 figs., 7 tables, 21 refs. **DLC** (QB1.A47)—Tables give values of spectral reflectivity (in 10 ranges from 4000–6880 Å) of 40 different meteorites (1787–1938) from the collections of the Akademic Nauk. Curves show variation with wave length of 5 different classes of meteorites, ranging from the darkest to the lightest colors. Relation of spectral reflectivity to mineral composition of the meteorite, comparison of the meteorites with samples of terrestrial objects and with planets and asteroids also shown graphically or in tables. The spectrophotometry was carried out in the laboratory with a prism spectrograph, and the measurements from the plates made with a Moll objective microphotometer, using daylight as a light source and a gypsum plate, or baryte paper as a standard of brightness. Values of albedo ranged from .06 to .52, with highest values obtained for the "white" class of meteorites, and in the long wave length (6000 Å). The same class (V) of meteorites shows an albedo of only 0.37 in the short wave ranges (4000 Å), whereas the Class I (dark) range from .06 to .09 from 4000 to 6500 Å. Terrestrial objects range from .02 for chernozem (moist) in all wave lengths to 104 for dry chernozem, .07 for asphalt, 0.18–0.34 for sand and 0.36–0.80 for clay. The planets Mercury (.07), and the moon (0.07) are as dark as the Class I meteorites, whereas Mars (0.15) and Calisto (0.14) compare with Class II, Saturn (.42) and Earth (.45) with Class IV and Neptune (0.52) and Venus (0.59) with Class V. *Subject Headings:* **1. Spectral reflectivity of meteorites 2. Albedo of planets 3. Albedo of soil.**—*M.R.*

8G–46 551.578.46:551.521

*Landsberg, Helmut, **The use of solar energy for the melting of ice.** *American Meteorological Society, Bulletin*, 21(3):102–107, March **1940.** fig., 4 tables. **DLC**—Radiation properties of snow cover are described. Use of coal dust for covering of snow surface in order to increase the intensity of melting is discussed and results of experiment are analyzed. (*Same item as* 7G–89, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Radiation of properties of snow.**—*N. T. Zikeev.*

8G–47 551.578.46:551.521.14

*Prohaska, F. and Thams, J. Chr., **Neue Untersuchungen über die Strahlungseigenschaften der Schneedecke.** [New investigations on radiative properties of snow cover.] *Helvetica Physica Acta*, Basel, 13:21–44, **1940.** 8 figs., 3 tables, 10 refs. **DLC**—Over 1000 albedo measurements obtained at Weissfluhjoch between Dec. 5, 1938 and April 21, 1939 have been analyzed and statistics presented as to frequencies with below and above freezing temperature; winter (Jan./Feb.) and spring (March/April), daily variations depending on sun's height, etc. Values range from >80% for dry new snow to 50–60% for wet snow. Penetration studies made with a photometer (300–800 mμ) showed that an even greater variation occurs in that parameter between dry new snow and moist snow. Data summarized include 180 observations, 124 at Davos and 56 at Weissfluhjoch. Dry snow gave extinction coefficients of .03 to .25 and moist snow 0.12 to 0.41 (averages 0.13 and 0.28 respectively). Greater variations occurred at Alpine station. (*Same item as* 7G–90, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Extinction coefficient of snow 3. Weissfluhjoch, Switzerland 4. Davos, Switzerland.**—*M.R.*

8G–48 551.521.14:551.588.6

*Sakharov, M. I., **Radiatsiia i albedo v lesnykh fitotsenozakh.** [Radiation and albedo in forest phytocenoses.] *Meteorologiia i Gidrologiia*, Leningrad, No. 5/6:3–20, **1940.** 11 tables, 10 refs. **DLC**—An attempt is made to determine the dependence of total radiation and albedo upon the topographical characteristics of a forest and within a forest, upon the growth and density of the forest canopy and upon mixtures of fir in phytocenose. Also the effect of isolated trees upon radiation was investigated. A Ianishevski pyranometer was used. Numerical data on total radiation, percent of radiation in open localities, illumination in lux and albedo associated with particular types of phytocenoses are presented in tables. (*Same item as* 8D–41, April 1957, *MAB.*) *Subject Headings:* **1. Albedo of forests 2. Forest radiation 3. Albedo measurements 4. Pyranometers.**—*I.L.D.*

8G–49 551.521:551.578.46

*Shpakovskaia, R. N., **Radiatsionnyĭ balans bukhty Tiksi.** [Radiation balance of Tiksi Bay.] *Problemy Arktiki*, No. 6:28–39, **1940.** 6 figs., 12 tables, refs. **DLC**—Data of direct, diffuse and outgoing radiation at Tiksi Bay for 1935–1938 are tabulated and discussed. Albedo measurements were in good agreement with data from other polar stations. Albedo values ranging from 86% for months with fresh snow cover to 30% for summer months without snow were used to calculate the radiation balance. An albedo value of 80% was used during the snow-melting period. The radiation balance was negative for the region during Oct.–May. The total annual radiation balance was equal

to an average of 1.38 kg.cal. (*Same item as* 7H–36, Aug. 1956, *MAB.*) *Subject Headings:* **1. Radiation climate of Tiksi Bay 2. Albedo of snow 3. Tiksi Bay, U.S.S.R.**—*S.I.P.R.E. abstract U5917.*

1941

8G–50 551.521.14:551.521.61:581.54

Obaton, Fernand, **Sur la réflexion du proche infrarouge par les surfaces végétales.** [Reflection of the near infrared by plant surfaces.] *Académie des Sciences, Paris, Comptes Rendus,* 212(14):621–623, **1941.** Also his: **La réflexion des radiations de grande longeur d'onde par les plantes de haute montagne.** [Reflection of long-wave radiation by alpine plants.] *Ibid.,* 218(18):721–723, **1944.** Also his: **Le pouvoir réflecteur des conifères pour le rayonnement infrarouge.** [Reflectivity of conifers in respect of infrared radiation.] *Ibid.,* 228(11):939–941, **1949.** foot-refs. **DLC**—Albedo values in respect of near infrared radiation were determined under laboratory conditions for leaf surfaces of several dozen various trees, herbs and mosses and are listed in these papers. It is found that plants generally exposed to intense radiation have greater reflectivity than those shielded from radiation. This is confirmed by measurements of the albedo of alpine plants (Pic du Midi), which show values generally twice as large as in the plains. *Subject Heading:* **1. Albedo of leaf surfaces.**—*G.T.*

1942

8G–51 551.521.14(98)

Defant, Albert, **Der Einfluss des Reflexionsvermögens von Wasser und Eis auf den Wärmeumsatz der Polargebiete.** [Influence of the albedo of water and ice on the heat balance of the polar regions.] *Deutsches Wissenschaftliches Institut, Copenhagen, Veröffentlichungen, Ser. I, Arktis,* No. 5, **1942.** 7 p. 5 refs., 4 figs., 2 tables. **DLC** (AS281.D4725)—Assuming that the earth is completely covered by an ocean, the loss by reflection of the midday direct solar radiation is 21½%. The reflection loss is especially great in the Polar regions starting with 60° lat. Waves increase the reflection even more. Further reflection losses are connected with the diurnal variation of the sola. height. When the declination is 0°, 4.5% of the incident energy is reflected at the equator; at latr 40°, 6.8% and at lat. 70°, 23% is reflected. [Abstractor's note: The numerical values in the paper often seem to be too large by a factor of π.] (*Same item as* 5I–127, Sept. 1954, *MAB.*) *Subject Headings:* **1. Albedo of water 2. Albedo of ice 3. Heat balance 4. Arctic solar radiation 5. Polar Regions.**—*A.A., S.F.*

8G–52 551.521.14

Judd, Deane B., **Fresnel reflection of diffusely incident light.** *U. S. National Bureau of Standards, Journal of Research,* 29(5):329–332, Nov. **1942.** fig., table, foot-refs. **DLC**—The reflection factor of a plane boundary between two media has been computed by the Fresnel formula for unpolarized, perfectly diffused incident light as a function of the relative index of refraction of the media. Because of total internal reflection, the factors depend importantly upon whether the diffuse flux is incident externally or internally. For example, diffuse light in air incident on the plane surface of glass of index 1.5 is 9.2% reflected; but if the perfectly diffuse light is incident internally, the reflection factor is 60%. *Subject Heading:* **1. Spectral reflectivity of diffuse light.**—*Author's abstract.*

8G–53 551.521.3

†Linke, Franz (*Frankfurt a.Main*), **Die kurzwellige Himmelsstrahlung.** [Short wave sky radiation.] *Handbuch der Geophysik,* Berlin, 8:339–431, **1942.** figs., tables, refs., bibliog. p. 428–431. **DWB**—In this chapter (Ch. 7), the author has organized and summarized knowledge of short wave sky radiation (diffuse) in great detail. Theoretical calculations for various solar angles and wave lengths, actual calorimetric observation by various authors in different parts of the world (e.g. Abbot and Fowle, 1905), light intensity or density of a cloudless sky, sky radiation in various spectral areas, circumsolar light intensity, blueness of sky, effect of clouds, albedo of clouds and earth, snow, ice, etc., and, finally, civil twilight in various latitudes and seasons are presented or analyzed with numerous tables and nomograms. (*Same item as* 6.4–189, April 1955, *MAB.*) *Subject Headings:* **1. Short wave sky radiation 2. Albedo 3. Sky radiation.**—*M.R.*

1943

8G–54 551.521.14

Hewson, E. W., **Reflection, absorption, and transmission of solar radiation by fog and cloud.** *Royal Meteorological Society, Quarterly Journal,* 69:47–62, **1943.** 8 figs., 2 tables, 16 refs., 10 eqs. Also: Hewson, E. W.; Gold, E. and Whipple, F. J. W., **Discussion.** *Ibid.,* 69:227–234, **1943. DWB**—Computations are made on basis of two-stream theory for clouds with drop radii of 20 and 5μ

and liquid water content, w, 0.1, 1.0 and 5 gms/m^3 and for cloud thickness t, of 20 to 4000 m. For larger drops, smallest w, and $t=20$ m, $R=1.4$, $A=0.1$ and $T=98.5$ in percent of incident radiation. For smaller drops, largest water content and thickest cloud, $R=93.6$, $A=6.3$ and $T=0.1$. Variation with sun's zenith distance is discussed, but author cautions that "the variations here found depend *only* on the [spectral] constitution . . . of the incident light," i.e. dependence of scattering and absorption on sun's zenith distance is not taken into account. Absorption by water vapor also neglected. Distribution of absorption by liquid water according to depth in cloud is given for cloud of 200 m thickness and 1.0 gm/m^3 water content. Approximately 5 times as much is absorbed in upper layer as in lowest layer. Several objections are raised by GOLD and WHIPPLE to HEWSON's analysis. The main one is that the sun's zenith distance, Z, must be taken into account by the introduction of sec Z into the analysis. HEWSON replies that, for the cloud parameters used, and for $Z=67°$, this effect is important only for the clouds with $w=0.1$ gm/m^3. *Subject Headings:* **1. Two-stream theory 2. Albedo of clouds 3. Atmospheric absorption 4. Solar spectrum.**—*S.F.*

1944

8G–55 551.521.14:551.576

Meeke, R., **Die Gesetze der Lichtausbreitung in optisch trüben Medien und das Sichtweiteproblem.** [The laws of light diffusion in optically turbid media and the visual range problem.] *Meteorologische Zeitschrift*, 61:195–199, **1944.** 5 figs., 8 refs., eqs. **DWB**—Two-stream theory. Presents equations for reflection, R, and transmission, T, as function of absorption and scattering pattern of particles. Fig. 1 shows that for forward scatter ten times backscatter (large waterdrops), albedo, R_∞, of infinitely thick clouds depends critically on small values of absorption coefficients. Fig. 4 shows R, T, and absorption A, for clouds with given T and R_∞; R is function of absorption coefficient and scattering properties of drops. Relates findings to horizontal visibility. *Subject Headings:* **1. Two-stream theory 2. Albedo of clouds.**—*S.F.*

1945

8G–56 551.521.3:551.510

*Fesenkov, V. G., **Nekotorye soobrazheniia ob opticheskikh svoĭstvakh atmosfery.** [Some remarks on the optical characteristics of the atmosphere.] *Astronomicheskiĭ Zhurnal*, 22(4):215–230, **1945.** 5 tables, 2 eqs. Summary in French p. 229–230. **DLC**—Most astronomers erroneously assume that the physical properties of the atmosphere vary only with height. Based on observations made by the author and others in the region near Alma-Ata, quantitative values of sky brightness at various angular distances from the sun, but especially in the immediate vicinity of the sun, lead to results contrary to expectation. The effect of albedo or type of reflecting surface (sand, glacier, snow, grass, etc.) proved to be negligible compared to the effect of atmospheric aerosols, especially dust. Charts of the deviation of daytime sky brightness from the theoretical were compiled and various factors indicated thereon in attempt to explain anomalies. Water vapor acts as an aerosol, not as a gas, hence does not follow the Rayleigh formula in respect to absorption. Equipment devised by the author for determining sky brightness and size and quantity of aerosol particles (ultramicroscopic) is described and data obtained from various sources are presented in tables. Work of HOUGHTON, STRATTON, VASSY, GÖTZ, ENGELHARD and FRIESS, and others cited. (*Same item as* 6–50, June 1950, *MAB.*) *Subject Headings:* **1. Sky brightness 2. Scattering 3. Aerosols 4. Albedo 5. Alma-Ata, U.S.S.R.**—*M.R.*

8G–57 551.521.14:551.463:551.507.352

Hulburt, E. O., **Optics of distilled and natural water.** *Optical Society of America, Journal*, 35(1):698–705, **1945.** 6 figs., 6 tables, foot-refs. **DLC**—Theory is discussed and data given in tables and curves for reflectivity (R) from sea surface over Chesapeake Bay (from boat and plane) and over the Atlantic Ocean for 150 mi to east of Maryland (from airplane on Aug. 10, 1943). Macbeth illuminometers were used. Under varying cloud conditions the values of R ranged from 0.019 (compared to 0.026 for theoretical) with a clear sky to 0.056 (compared to 0.052) for a cloudy sky over Chesapeake Bay; and from 0.022 to 0.034 for sunny and 0.052 for cloudy sky over the Atlantic Ocean. Effect of plankton on changes in color of sea is mentioned. Absorption and scattering of distilled water in laboratory and of natural water is also discussed on the basis of data and theory. *Subject Headings:* **1. Reflectivity of sea water 2. Albedo of sea surface 3. Airplane observation of albedo 4. Chesapeake Bay 5. N. Atlantic Ocean.**—*M.R.*

8G–58 535:355

Optika v voennom dele. [Military optics.] Ed. by S. I. Vavilov and M. V. Sevast'ianova. Moscow, Akademiia Nauk SSSR, **1945.** 3rd rev. and enl. ed. 2 Vol. (391 and 387 p.) tables, numerous figs. and eqs. Bibliog. at end of each vol. **DLC** (QC371.O73)—In this technical text

on optics as applied to military problems (visibility, camouflage, surveying, aerial photography, artillery, smoke screens, signalling, air navigation, night vision, etc.), a section is devoted to explanation of the phenomenon of albedo, and its variation with roughness, angle of incidence of light, polarization, nature of substance, etc. (p. 35–36 of Vol. I). Vol. 1 deals with physical and applied aspects; Vol. 2 with instrumental and optical systems or equipment. *Subject Headings:* **1. Military optics 2. Albedo. I. Vavilov, S. I.** (*ed.*) **II. Sevast'ianova, M. V.** (*ed.*).—*M.R.*

1947

8G–59 551.521.14:535.243:551.578.46

*Krinov, E. L., **Spektral'naia otrazhatel'naia sposobnost' prirodnykh obrazovanii.** [Spectral reflectance properties of natural formations.] Moscow, Akademiia Nauk, **1947.** 270 p. 177 figs., 15 tables, 45 refs., append. 70 p., tables. **DLC.** Also, translation by E. Belkov, issued as *National Research Council of Canada, Technical Translation*, TT-439, **1953.** 268 p. 27 figs., 15 tables, 45 refs. in text. (Same as 8D–48). **DWB**—Results of 370 spectrophotometric measurements of albedo of numerous types of natural surfaces are analyzed with basic data listed in tables, and curves of intensity in wave lengths from .4–.9μ for each observation systematically presented. Among the types of surface covered are inland waters, forest (birch, oak, fir, willow, linden, pine, elm, larch), grasses, tundra, orchards, gardens, stone and dirt roads, snow cover, buildings, etc. Not only are various types of each of the above surfaces analyzed, but variation in each type, according to season, homogeneity, stage of development, etc. are treated separately. The textual section treats of the theory of spectrophotometry, methods of observation, details of instrumentation for use in aerial photography of albedo and methods of compiling data. Spectrophotometric observations were made in nine regions of the European USSR from Arctic to subtropics (including tundra, taiga, chernozem, forested steppe, steppe, desert and mountain areas) between 1932 and 1942. A total of 905 reels and 10,316 spectrograms were obtained and analyzed, constituting one of the most worthwhile contributions in this field from a practical and a theoretical standpoint. For the most part the measurements were made in the vertical (nadir) direction, or at 45°; the azimuth was usually 90° from the sun, but other angles were used occasionally. A brief summary of the pertinent data is given below. Variations within each category depend on the degree of dryness of the surface, the angle of elevation of the sun and the angle the terrain is viewed, etc. For fir forests $r_\lambda = 0.02$ from the air and 0.05 to 0.12 from the ground. Inland waters, because of their muddy nature, have spectral curves similar to those of soils, i.e. the reflectance curves slant gradually upward from violet to red. Buildings and building material are mainly like bare areas and soils except for red brick and asphalt. A spectrophotometrical classification is given:

1. Curves in which the reflectance (r_λ) increases with wavelength (λ) from violet to red (bare areas and soils, buildings, dry vegetation)
2. Curves having a maximum in the visible near $\lambda = 5600$ Å, and relatively high values in the entire infrared region (vegetation: forests, grass, etc. in the growing season)
3. Curves in which r_λ decreases with λ (snow and water surfaces)

Summary of average reflectance (r_λ)

λ(mμ)	Forest and shrubs	Grass	Bare areas and soils	Snow
400	0.017–0.061	0.032–0.082	0.024–0.357	0.216–0.970
500	0.016–0.083	0.052–0.150	0.026–0.558	0.231–0.890
550	0.031–0.168	0.080–0.194	0.029–0.622	0.235–0.775
600	0.028–0.195	0.077–0.225	0.030–0.667	0.253–0.760
650	0.022–0.193	0.080–0.216	0.035–0.697	0.210–0.760

Infrared	Fir	Aspen	Field and grass	Bare area and soils	Snow
700					(0.330–0.930)
750	0.174		0.223–0.486	(0.184–0.302)	(0.360–0.930)
800	0.173	0.596	0.257–0.548	0.059–(.303)	(0.370–0.930)
840	0.180	0.610	0.424–0.594	0.071–(.286)	(0.360–0.930)
900					(0.340–0.930)

These extensive data would not only help one to calculate the albedo of the earth's surface from a knowledge of astronomical and vegetative factors, but would facilitate the selection of proper filters for aerial photography. Cloud albedo is not, however, considered. (*Same item as* 3.3–131, March 1952 and 7G–12, July 1956, *MAB*). *Subject Headings:* **1. Albedo of earth 2. Spectral reflectance of natural surfaces 3. Spectrophotometric data 4. Aerial photography 5. U.S.S.R.**—*S.F. and M.R.*

1948

8G–60 551.521.14:551.578.46

*Fritz, Sigmund, **The albedo of the ground and atmosphere.** *American Meteorological Society, Bulletin*, 29(6):303–312, **1948.** 4 figs., 5 tables, 10 refs. **DWB** -During a cross-country flight, the upward and downward components of total solar and sky radiation were measured with Eppley pyrheliometers in March, 1947. The albedo of the ground, except where covered with patches of snow, was between 0.07 and 0.10 increasing to 0.17 over the western mountains. The snow-covered patches had albedos up to 0.29. Albedos uncorrected for air between plane and ground averaged a few percent higher. Absorption in the layer from 7,000 ft to 10,000 ft was about 0.02 ly/min; from 7,000 ft to the ground it was 0.04 ly/min. This by itself corresponds to a temperature rise of 0.05°C/hr. The total energy absorbed by the ground and lower atmosphere was about 80% of the energy incident on "top" of the atmosphere. Measurements are compared with those of other authors. (*Same item as* 7G–112, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of earth's atmosphere 2. Albedo of ground 3. United States.**—*S.F.*

8G–61 551.521.14:551.578.46

Iaroslavtsev, I. N., **Otrazhennaia radiatsiia ot estestvennykh poverkhnostei v Tashkente.** [Reflection of radiation from natural surfaces in Tashkent.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. i Geofiz.*, 12(6):523–530, **1948.** 9 figs., 7 tables, 4 refs. **DWB, DLC**—Results of systematic observation on reflection from snow, green and dry vegetation, conducted at Tashkent for 32 mos in 1940 and 1944–46 with albedometer of Iu. D. Ianishevskiĭ. Intensity of reflected radiation, albedo of natural cover, and total heat of reflected radiation were observed; calculated albedo varies from 12% for grass to 93% for snow. Monthly total amount of reflected radiation constitutes 15–45% of monthly total heat of radiation. On the average, one-fourth of the annual total radiation is reflected from natural cover of the earth. (*Same item as* 1–72, Jan. 1950, *MAB.*) *Subject Headings:* **1. Solar radiation 2. Albedo of snow 3. Albedo of vegetation 4. Tashkent, U.S.S.R.**

8G–62 551.521.14:551.463

*Neiburger, M., **The reflection of diffuse radiation by the sea surface.** *American Geophysical Union, Transactions*, 29(5):647–652, Oct. **1948.** 3 figs., table, 4 refs., eqs. **DWB**—The albedo of the ocean off California was measured from a blimp with Eppley pyrheliometers during the summer of 1945. The mean of 117 observations was 10.5%. The standard deviation of the mean was 0.5%. The albedo varied with the sun's altitude, indicating that the downcoming solar radiation was not perfectly diffuse on the average. For a solar elevation of 70°, the albedo was about 9%; for a solar elevation of 33° it was 14%. The albedo also varied with the total optical thickness of the cloud, for a constant solar elevation; for thicker clouds the albedo is higher than for thinner clouds. *Subject Headings:* **1. Albedo of sea surfaces 2. Cloud overcast 3. Solar elevation 4. California Coast.** —*S.F.*

8G–63 551.521.14:551.576

Piotrowski, Stefan, **Uwagi o świeceniu atmosfery.** [Remarks on the brightness of the atmosphere.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, No. 2–4:39–43, Dec. **1948.** table. English summary p. 43. **DWB**—A theory of radiative transfer in planetary atmospheres, developed by the author, is applied to the problem of scattering from clear or cloudy sky and of reflection from clouds. Observations by Dorno and Schönberg are analyzed and presented in tabular form. Brightness of overcast sky varies from zenith to horizon as $2+3\cos Z$, where Z is zenith distance. (*Same item as* 2.6–65, June 1951, *MAB.*) *Subject Headings:* **1. Scattering 2. Albedo of clouds.**— *From author's abstract.*

8G–64 551.521.14

*Pleshkova, T. T., **Al'bedo zemnykh obrazovaniĭ.** [Albedo of ground formations.] *Priroda*, Moscow, 37(10):44–49, **1948.** 2 figs., 3 tables, diagrs., 12 refs. **DLC**—Albedo values reported for different surfaces by various authors are reviewed. For snow albedo, values between 94 and 45% have been reported, depending on purity and dryness. For sea ice values range from 53 to 22%, for grassland 10–32%, for bare ground 5–37%, for plant cover 9–46%. For water surfaces the average albedo is 8% (diffuse radiation), for clouds 54% (stratus), 64% (cumulus) and 76% (altostratus), for the human skin 35%. *Subject Heading:* **1. Albedo data.**—*G.T.*

8G–65 551.521.14

*Sauberer, F., **Über die Strahlungseigenschaften der Pflanzen im Infrarot.** [Radiative properties of plants in the infrared.] *Wetter und Leben*, 1:231–234, Nov. **1948.** fig., 3 refs. **DWB**—The reflection of many plants is higher in the near infrared than in the visible, but with aid of a double quartz monochrometer, photocells, and bolometers the results are extended 2.6μ. Results are

shown for a few fresh and dried leaves. Both the transmission and reflectivity have a maximum near 1.2μ of about 35 to 50%. These fall to about 10% near 2.6μ. The moist leaves show bands near 1.5 and 2.0μ which are missing in the dry leaves. *Subject Headings:* **1. Albedo of plants 2. Infrared albedo.**—*S.F.*

8G–66 551.578.46:551.311.12(485)

†*Wallén, Carl Christian, **Glacial-meteorological investigations on the Kårsa glacier in Swedish Lappland, 1942–1948.** *Geografiska Annaler*, Stockholm, 30(3/4):451–672, **1948.** 57 figs., 53+13 tables, 11 eqs., bibliog. p. 665–670. **DLC**—The history of various phases of glacio-meteorological observations is reviewed with ample literature citations going back to the earliest days. The plans for the investigations and details of the expedition are thoroughly outlined and illustrated; the site is described and shown on small and large scale maps. The climate of the area, weather condition in the various years (1941–48), radiation measurements with actinograph, variation of radiation with cloudiness, albedo of snow and ice, outgoing radiation, temperature and humidity, vapor pressure, wind effects, variations at different points in the glacier, variations with height (10, 170, 400 and 600 cm) above glacier, precipitation and fog, deposition, accumulation and ablation for each year, heat balance at glacier surface (analyzed and discussed at great length), comparison with results from other regions of the world, etc. etc., are treated. Appendix gives *in-extenso* the actual observations of incoming radiation and mean cloudiness (every 2 hours for the entire 148 days of the period 1942–48), albedo measurements for summers of 1946–48, temperature, wind, relative humidity at different places and nights, etc. for each day. Highest albedo was 76.6% for frozen snow, lowest 30.9% for wet ice, mean value 60.3%. Causes of ablation and variations in ablation of both snow and ice over the years 1901–1948 are thoroughly analyzed. Detailed calculations of ablation are made for selected periods; many graphs, tables, profiles, etc. are included and a thorough bibliography of references to 169 works which were cited is appended. (*Same item as* 7G–15, July 1956, *MAB.*) *Subject Headings:* **1. Thermal balance of snow cover 2. Glacial ablation 3. Albedo of snow 4. Glacier-meteorological expeditions 5. Kårsa Glacier, Swedish Lapland.**—*M.R.*

1949

8G–67 551.521.14

Fritz, Sigmund, **The albedo of the planet earth and of clouds.** *Journal of Meteorology*, 6(4):277–282, **1949.** 4 figs., tables, 22 refs. **DWB**—Taking as a basic datum DANJON's measured visual albedo of the whole earth (0.39), the albedo of the earth in total sunlight is computed to be 0.35. The albedo of the earth's surface, clouds and atmosphere are computed separately in ultraviolet, visible and infrared light. After allowing 2% for the absorption by ozone, the albedo of the whole earth is 0.50 in UV, 0.39 in visible (DANJON), and 0.28 in infrared. Of the total light incident on the earth, the percentage reflected is 2.3 by the earth's surface, 23 (or 26) by clouds, and 9 (or 6) by the atmosphere, making the total of 35. The albedo of clouds is computed to be about 0.5 which is in better agreement with observation than the previously most quoted value of 0.78. *Subject Headings:* **1. Albedo of earth 2. Albedo of clouds 3. Spectral albedo.**—*S.F.*

8G–68 551.521.14:551.584

*†Laĭkhtman, D. L. and Chudnovskiĭ, A. F., **Fizika prizemnogo sloia atmosfery.** [Physics of the layer of air near the ground.] Leningrad, Gosudarstvennoe Izdat. Tekhniko-Teoreticheskoi Lit-y, **1949.** 254 p. 49 figs., 19 tables, 72 refs., 333 eqs. On half-t-p: **Sovremennye problemy fiziki,** ed. by C. I. Vavilov, et al. (*See* 8–24, Aug. 1950, *MAB.*) **DLC** (QC861.L25)—In this detailed book on micrometeorological processes, Ch. 2 takes up radiative and thermal processes in the soil, and Sec. 3 of Ch. 2 (p. 27–32) the reflective properties of soil. The coefficient of brightness (β) is distinguished from the albedo (α) which does not depend on direction or sun's angle. The albedo does, however, vary with wave length, and hence with solar height, especially at low angles where more of the radiation is in the longer wave lengths than with high solar angles. Methods of measurement (using SAVINOV's actinometer), effect of soil roughness and moisture in decreasing the albedo and, finally, a table giving albedos obtained by various authors for 33 types of surface are outlined and illustrated. The values given are: water, 9–10%; snow, 45–82%; sand, 18–43%; humus, 25%; chernozem, 15–20%; clay, 30%; dry grass, 19%; meadow, 10%; sandy meadow, 13%; cotton, 21%; alfalfa, 21%; rice, 12%; lettuce, 22%; onions, 17–18%; potatoes, 19%; rye, 18%; winter wheat, 16–23%; spring wheat, 10–25%; oak crowns, 18%; pine, 14%; fir, 10%. *Subject Headings:* **1. Albedo measurements 2. Micrometeorology.**—*M.R.*

8G–69 551.521:551.576

*Neiburger, Morris, **Reflection, absorption, and transmission of insolation by stratus cloud.** *Journal of Meteorology*, 6(2):98–104, April **1949.** 7 figs., 9 refs., 16 eqs. **DWB, MH-BH**—Observations were made below, in and above stratus cloud off California with two Eppley pyrheliometers

mounted above and below one blimp. Observations below and above clouds were therefore not made simultaneously. Albedo varied with thickness H but with larger standard deviations for thin clouds than for thick ones. For $H < 500$ ft, albedo varied from about 5 to 65%, for H near 2000 ft, albedo averages about 75%. Highest albedo reported is about 85%. Observed absorption is erratic, negative values appearing; mean absorption of all measurements is estimated as 5 to 9%. Drop size distribution and liquid water content w is also measured on a few occasions. Two-stream theory, allowing for variation of w with cloud depth accounts for albedo of thick clouds, but agreement is poorer for thin clouds. (*Same item as* 3F–119, June 1952, *MAB.*) *Subject Headings:* **1. Albedo 2. Two-stream theory 3. Atmospheric absorption 4. Stratus clouds 5. Drop size and liquid water content 6. California.**—*S.F.*

8G–70 551.521.14

Saito, R., **The surface reflection of a mat surface.** *Meteorological Society of Japan, Journal,* 2nd Ser., 27(5):140–145, May **1949.** fig., table, 8 refs., 13 eqs. In Japanese; English summary following p. 168. **DWB**—The reflection from a corrugated surface such as snow, soil or a white wall is considered mainly from the point of view of the direct reflection from the surface, ignoring the multiple reflection inside the reflecting material. Formulas, based on ORNSTEIN (1937), but modified after FRESNEL, are presented for the partial albedo due to the surface itself (1) when the incident light is parallel (not diffuse), and (2) when the incident light is diffuse. This equation was obtained by BOUTARIC (1931) but has been simplified by the author. Thus for direct radiation $R_\alpha = M_\alpha / \mathrm{Cos}_\alpha$, and for diffuse light $R = 2\int_0^{\frac{\pi}{2}} M_\alpha \sin \alpha d_\alpha$, where M_α is direct albedo at angle α. *Subject Headings:* **1. Albedo of mat surfaces 2. Albedo due to direct light 3. Albedo due to diffuse light.**—*M.R.*

8G–71 551.521.14:551.578.46

Saito, R., **On the reflection of the snow surface.** *Meteorological Society of Japan, Journal,* 2d Ser., 27(6):169–174, June **1949.** figs., tables, 4 refs., 10 eqs. English abstract p. 205. **DWB**—The theory worked out in the previous paper (*see* 8G–70) is applied to calculations of albedo of a snow surface consisting of numerous ice facets. Conclusion is that reflection is strongest in the horizontal direction of the side opposite the incident rays, rather than as in the case of a plane surface. The total reflection is found to be about 30% less than theoretical, owing to lack of effective reflection from the hollows—most of the multiple reflection coming from the projections of the uneven surface. Finally, the author wishes to classify surface conditions of snow from the intensity distribution of reflected light. *Subject Headings:* **1. Albedo of snow 2. Multiple reflection from snow surface.**—*From author's abstract.*

8G–72 551.521.1(481) 551.508.2

*Schieldrup Paulsen, H., **Investigations carried through at the Station of Forest Meteorology at Os, Pt. 1, On radiation, sunshine, and cloudiness.** *Bergen, Universitetet. Årbok 1948, Naturvitenskapelig Rekke,* No. 7, [**1949.**] 44 p. 19 figs., 9 tables, 34 refs., 15 eqs. **DLC**—A detailed theoretical and empirical analysis of radiation data obtained during the summers of 1944 and 1945 at Os, 30 km south of Bergen. About 20% of the sky (to the north) was covered by trees. Instruments (Robitzsch actinograph, Moll-Gorczyński solarimeters and UV dosimeter) are described in detail and comparisons with records made at Stockholm given. Numerous scatter diagrams and graphs show, respectively, the relation between global radiation and altitude of sun on clear and overcast days, between global radiation and duration of sunshine, between cloudiness and duration of sunshine, between various cloud types and global radiation. Others show the influence of cloud albedo, effects of ultraviolet radiation in all its aspects and, finally, the daily values of global radiation for the period of record. (*Same item as* 7–57, July 1950, *MAB.*) *Subject Headings:* **1. Global radiation data 2. Ultraviolet radiation 3. Albedo of clouds 4. Os, Norway.**—*M.R.*

1950

8G–73 551.521(02)

Chandrasekhar, Subrahmanyan, **Radiative transfer.** Oxford, Clarendon Press, **1950.** 393 p. 35 figs., refs., eqs. Price: $8.50. **DWB**—In precise, mathematical fashion the equations describing the scattering and absorption of energy are described in Ch. I and II. In Ch. III through VI these equations are applied to semi-infinite atmospheres in which the scattering pattern of a single particle obeys a simple law. Ch. VII and VIII are devoted to the mathematical principles of scattering in finite atmospheres, and in Ch. IX numerical results are given for intensity of diffuse reflection and transmission by plane-parallel atmospheres as a function of the optical thickness τ under conditions of isotropic scattering with and without absorption. In Ch. X scattering in semi-infinite and in finite atmosphere according to Rayleigh scattering is considered; numerical results for $\tau = 0.2$ with

ground albedo 0.0, and 0.1, show that for angle of incidence of the "solar" beam of 60°, the intensity of diffuse transmitted light is about 0.1 in the vertical and increases to 0.6 near the horizon. Polarization effects are also shown. Ch. XI, XII and XIII are concerned with stellar atmospheres, and astrophysical problems such as the production of absorption lines in atmospheres, the escape of trapped radiation from an atmosphere, and a problem involving spherical symmetry. Although numerical results are shown only for "simple" scattering laws, such as isotropic and Rayleigh scattering, scattering with more general laws is discussed theoretically at a few places in the book. (*Same item as* 4.9-2, Sept. 1953, *MAB.*) *Subject Headings:* **1. Scattering 2. Atmospheric absorption 3. Albedo 4. Transmission 5. Polarization 6. Astrophysics 7. Textbooks.**—*S.F.*

8G–74 **551.521.14:551.576**

Fritz, Sigmund, **Measurements of the albedo of clouds.** *American Meteorological Society, Bulletin*, 31(1):25–27, Jan. **1950.** 2 figs., table, 4 refs. **DWB, MH-BH**—Discussion of four flights made to determine albedo of upper surface of clouds, and quantitative results of these flights. Two of the flights were from Washington to Pittsburgh and two of them in Southern California. The planes flew at elevations varying from 10,000 to 17,000 ft and carried two Eppley pyrheliometers and a Brown recording potentiometer. Stratocumulus clouds proved to have a higher albedo than alto-stratus. However, differences in solar altitude, α, may account for much of the differences. Alto stratus and cirrus stratus albedos varied from 0.39 to 0.64 with $\alpha = 45°$. Stratocumulus albedo varied from 0.20 to 0.81 with $\alpha = 7°$ to 20°. (*Same item as* 4-76, April 1950, *MAB.*) *Subject Headings:* **1. Albedo of clouds 2. Airplane albedo observation.**—*M.R., S.F.*

8G–75 **551.521.14:677**

Lopukhin, E. A., **K voprosu o radiatsionnom rezhime khlopchatnika.** [Problem of the radiational regime of cotton plants.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. i Geofizich.*, No. 3:260–266, **1950.** 2 figs., 5 tables, 9 refs., 4 eqs. **DLC** (AS262.A6246)—In the study of the optics and radiation balance of a cotton field it—the albedo of the soil and the cotton in different stages of growth—is an important factor for it determines the amount of solar energy absorbed in the field. A table gives an albedo of 0.20 in clear weather, 0.20 and 0.21 in partly cloudy weather for bare and covered ground, 0.18 with a covered field and cloudy weather, and 0.12 and 0.13 for bare and covered moist ground. It is believed that the albedo of a cotton field is essentially that of the soil under the cotton plants. Curves show variations of albedo with varying soil conditions, cover conditions and weather. A series of annotated curves shows the seasonal (day to day) variation in albedo of soil with: 1) natural cover, 2) fallow field and 3) cotton crops. The crop stage, soil condition, amount of rainfall or irrigation, and character of the natural cover are indicated for each day or period from March to Dec. The radiation balance and evaporation are also worked out and presented in tables and graphs. The work was done at the Tashkent Geophysical Observatory during or before 194[illegible] using a pyranometer, albedometer and 2 galvanometers. *Subject Headings:* **1. Albedo of cotton fields 2. Albedo of soil 3. Radiation climate of fields.**—*M.R.*

8G–76 **551.521.14:551.578.4[illegible]**

Miller, David H., **The depletion method of estimating solar radiation absorbed by the snow** U. S. Corps of Engineers, Project CW-171, Technical Bulletin, No. 5, April 10, **1950.** 11 p. 3 tables graph, refs. **DWB**—The method described in this paper is based on computations of W. H. Klein reported in *Journal of Meteorology*, 5:119–129, 1948. Values of depletion due to scattering, reflection and absorption by air, dust, water vapor and clouds are deducted from the initial value of solar heat outside the atmosphere, thus providing final values of incoming radiant energy. Through use of methods to estimate albedo of the snow surface by its age and time of day, the value of solar radiation absorbed by the snow pack can be computed. Methods for obtaining the detail values and for computing them are discussed and explained with practical examples from data at the Central Sierra Snow Laboratory and the Upper Columbia Snow Laboratory. (*Same item as* 5.3–169, March 1954, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Absorption by snow pack 3. Snow pack 4. Central Sierra Snow Laboratory 5. Upper Columbia Snow Laboratory.**—*G.T.*

8G–77 **551.521.14:551.578.4**

Miller, David H., **Albedo of the snow surface with reference to its age.** U. S. Corps of Engineers, Project CW-171, Technical Bulletin, No. 6, April 21, **1950.** 8 p. table, graphs, refs. **DWB**—Two graphs (one for the accumulation season and one for the melt season) showing albedo as a function of the age of snow surface are presented. They are based on albedo measurements made at the Central Sierra Snow Lab. (1945–1948) and the Upper Columbia Snow Lab. (spring season 1947–48). Albedo values are grouped into six age classes from fresh snow up to snow 8 days old and more. The effects of rain, of surface debris (like pine needles, solid smoke particles), of sun angle, and of radiation absorption by underlying rock are considered. (*Same item as* 4.5–111, Ma[illegible]

953, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Age of snow 3. Upper Columbia Snow Laboratory 4. Central Sierra Snow Laboratory.**—*G.T.*

8G–78 551.578.46:551.521.14

Miller, David H. (*Cooperative Snow Investigations*), **Albedo of the snow surface as related to weathering factors and stage of the snow.** *U. S. Corps of Engineers and U. S. Weather Bureau, Cooperative Snow Investigations, Research Note,* [No. 1], Dec. 11, **1950.** 11 + p. 2 figs., tables, refs. **DWB**—Albedo of snow during the winter decreases exponentially from values above 80% just after a snowstorm to 65% after about 400° of accumulated daily maximum temperature. During the beginning of snow melt the decrease is from 70% to 60% after 400° and to 45% after 1000° accumulated maximum temperature. During the heaviest runoff the albedo declines from about 60% to 45% after 400 degree days. Results of measurements and the mathematical analysis are presented in detail. (*Same item as* 2.11–97, Nov. 1951, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Snow melt 3. California. 4. Central Sierra Snow Laboratory.**—*A.A.*

8G–79 551.521:551.311.12

Sauberer, F. and Dirmhirn, I., **Die Bedeutung des Strahlungsfaktors für den Gletscherhaushalt.** The importance of the radiation factor in the economy of glaciers.] *Wetter und Leben,* 2(11–12): 248–261, June **1950.** 3 figs., 11 tables, 14 refs. **DWB**—Authors calculate incoming radiation (sun, sky, long wave), outgoing (reflection, long wave) and radiation balance for each month at 3000 m in the Alps. The most variable factor is the reflection from snow surface; albedo varies from 0.8 with new snow to below 0.2 (old dirty ice). Frequent light snowfalls therefore cause negative radiation balance. (*Same item as* 9–76, Sept. 1950, *MAB.*) *Subject Headings:* **1. Radiation 2. Albedo of snow 3. Glaciers 4. Alps.**—*C.E.P.B.*

1951

8G–80 551.521.14:581.54

Billings, W. D. and Morris, Robert J., **Reflection of visible and infrared radiation from leaves of different ecological groups.** *American Journal of Botany,* Baltimore, 38(5):327–331, **1951.** 2 refs., 2 figs. **DLC**—Monochromatic reflectance from 400 mμ to 1100 mμ was measured by means of a Beckman DU spectrophotometer from the upper leaf surfaces of twenty species of plants selected from five environments in the western Great Basin. In general, the reflectance curves of green leaves showed values of about 5% at 400 mμ rising to a peak of about 15% at 550 mμ with a gradual slope down to about 5 or 6% at 675 mμ. Above this wave length the curves rose steeply to a plateau of approximately 50% reflectance in the infrared region extending from about 775 to 1100 mμ. Averages show that the desert species reflect the greatest amount of visible radiation, followed by the subalpine, west-facing pine forest, north-facing pine forest, and shaded campus species in that order. In the infrared the differences between groups were not so marked. The greatest infrared reflectance, almost 70%, was measured from the glabrous leaves of the desert peach, *Prunus andersonii.* *Subject Heading:* **1. Albedo of leaf surfaces.**—*From authors' abstract.*

8G–81 551.521.14

Feĭgel'son, E. M., **Radiatsionnye svoĭstva oblakov St.** [Radiation characteristics of stratus clouds.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.,* No. 4:92–117, July–Aug. **1951.** 9 figs., 9 tables, 14 refs., 40 eqs. **DLC**—The approximate equations for transfer of radiant energy in clouds, using a nonspherical index of scattering, are used to set up tables and curves for albedo of the cloud surface under varying angles of incident radiation, the transmission coefficients for direct and diffuse radiation, the variation with height of the long wave, radiation in a cloud, etc. Work is based on previous work of the author and recent work of Albrecht, Neiburger, Stratton and Houghton, von Kampe and others. Numerous tables of coefficients are given. (*Same item as* 3.3–130, March 1952, *MAB.*) *Subject Headings:* **1. Albedo of clouds 2. Atmospheric absorption 3. Stratus clouds.**—*M.R.*

8G–82 551.521

*†Fritz, Sigmund, **Solar radiant energy and its modification by the earth and its atmosphere.** In: **Compendium of Meteorology,** American Meteorological Society, Boston, **1951.** p. 13–33. 7 figs., 7 tables, 79 refs., 26 eqs.) **DWB**—A review is given of the albedo of various constituents of the earth and its atmosphere. Pure dry air has an albedo of about 8%. Effects associated with water vapor constitute about 5% at most; dust may contribute 1%. The average cloudless portions of the atmosphere reflect about 6–9%. Cloud albedo measurements are summarized; measurements of albedo of various land and water surfaces are given. The computed albedo of water varies from 4% with the sun in the zenith to 100% with the sun at the horizon. The albedo of the planet earth is taken as 0.35 for total sunlight. Other estimates of 0.43 and 0.415 are cited. The significance of

large observed changes of the earth's albedo is discussed. (*Same item as* 3.11–2, Nov. 1952, *MAB.*) *Subject Heading:* **1. Albedo of earth.**—*S.F.*

8G–83 551.521.14

†Goody, R. M. and Robinson, G. D., **Radiation in the troposphere and lower stratosphere.** *Royal Meteorological Society, Quarterly Journal,* 77(332):151–187, April **1951.** 7 figs., 3 tables, numerous refs. and eqs. Also Fritz, Sigmund, [**Comments on above article**], *Ibid.,* 77(333):455–456, July **1951. DWB, DLC**—On p. 156–7 of this comprehensive and critical summary of knowledge of the radiative characteristics of the earth's atmosphere, the authors discuss the values of albedo which have been determined by various authorities: Danjon, 39% for visual albedo; Fritz, 35% for earth as a whole; Aldrich, 78% for cloud; Fritz, 50%–55% for cloud; and Danjon 5% variations in visual albedo of earth. Fritz in "Comments" clarifies apparent discrepancies between values for clouds cited from Aldrich (78%) and from his work (50–55%). The former was for one cloud type (stratus) at one place (Mt. Wilson), on one morning (Sept. 17, 1918), whereas the value of 50–55% which he himself cites was for all cloud types on the earth as a whole, using Danjon's average of 0.39 for visual albedo of earth. It would be surprising if all cloud types had the same albedo, or even if the same type (e.g. stratus) always had the same albedo. (*Same items as* 2.6–63 June 1951 and 2.10–93, Oct. 1951, *MAB.*) *Subject Headings:* **1. Albedo of earth 2. Albedo of clouds.**—*M.R.*

8G–84 551.501.4(083

*List, Robert J., (*comp.*) (*U. S. W. B., Wash., D. C.*), **Smithsonian meteorological tables.** 6th rev. ed. Wash., D. C., Smithsonian Institution, **1951.** 527 p. 174 tables, numerous foot-refs. numerous eqs. **DLC**—On p. 442–443 (Table 154) the albedos of various surfaces obtained by a number of authorities in various parts of the world are listed. The values obtained for snow are 1) fresh snow—81% (Ångström), 87% (Kalitin), 70–86% (Kimball and Hand, from the air) 2) old, white, smooth snow—70%; 3) old (lowest value)—46% and 4) ice with sparse snow cover—68%. Values for clouds range from 5% to 84%; grass, 14–37%; forests, 3–25%; ocean, 3–46% sand, 9–28% and earth, 7–20%. (*Same item as* 3.1–19, Jan. 1952, *MAB.*) *Subject Headings* **1. Albedo of snow 2. Albedo of clouds. I. Smithsonian Institution.**—*M.R.*

8G–85 551.52

London, Julius, **Study of the atmospheric heat balance.** New York Univ. College of Engineering, Contract AF 19(122)-165, Progress Report 131.05 and 131.06, March and May **1951.** 2 pieces figs., tables, refs., eqs. **DWB**—Report 131.05: The distribution of absorption of insolation by water vapor is computed as a function of height and latitude. By considering the infrared radiational loss by the atmosphere, previously computed, and the present calculations of absorption by insolation it is shown that the entire troposphere constitutes an energy sink as far as radiative processes are concerned. It is found that at all latitudes, the largest radiational heat loss is in the middle troposphere. In Report 131.06: A model of the heat budget of the atmosphere for the Northern Hemisphere for March is presented. This model is based on previously derived distributions of the insolation received at the top of atmosphere and the net radiative flux of absorption of these radiative currents by the various atmospheric constituents. The model is also based on new estimates of the albedo of the atmosphere and of net outgoing radiation from stratosphere. (*Same item as* 6.1–15 Jan. 1955, *MAB.*) *Subject Headings:* **1. Heat balance 2. Radiation balance 3. Albedo of atmosphere 4. Infrared radiation 5. Absorption by water vapor.**—*Author's abstract, M.R.*

8G–86 523.3:551.521.1

Markov, A. V., **Obrazovanie rel'efa i fizicheskie svoĭstva lunnoĭ poverkhnosti.** [Formation of the relief and physical properties of the surface of the moon.] *Priroda,* Moscow, No. 9:12–2 Sept. **1951.** 7 figs., 27 refs. **DWB**—A major popular article, giving many details of the present day knowledge of morphology, physiography, soil or rock formations, radiative characteristics (albedo), climate, etc. of the moon. (*Same item as* 4.5–243, May 1953, *MAB.*) *Subject Heading* **1. Albedo of moon 2. Lunar atmosphere 3. Planetary atmospheres.**—*M.R.*

8G–87 551.578.46:551.5

*Sulakvelidze, G. K., **Nekotorye radiatsionnye svoĭstva sukhogo snega.** [Some radiation properties of dry snow.] *Akademiia Nauk Gruzinskoĭ SSR, Soobshcheniia,* 12(8):467–473, 195 2 figs., 2 tables, 3 refs., 6 eqs. **DLC**—Results of observations made during 1946–1950 in mountain regions at 2000–5600 m above s.l. are analyzed. Dependence of albedo on state of snow cover angle of sun rays, as well as on the degree of moistening and purity of snow cover are discussed. The maximum albedo was 97.2% for dry snow with vertical illumination. Investigations of sunlight penetration showed that the rays of 6500–6600 Å are absorbed in the upper 5–7 cm layer. Of the total amount of solar radiation, 13.7% penetrated to a depth of 10 cm, 3.3% to 20 cm, and 1.8

o 40 cm. (*Same item as* 7G–159, July 1956, *MAB.*) *Subject Headings:* **1. Radiation properties of :now 2. Albedo of snow 3. Georgia, U.S.S.R.**—*N. T. Zikeev.*

8G–88 551.521.14:523.43

Tikhomirov, V. S., **Sezonnye izmeneniia nekotorykh otrazhatel'nykh svoĭstv rasteniĭ i vopros o astitel'nosti na marse.** [Seasonal change in some reflective characteristics of vegetation and roblems of vegetation on Mars.] Alma-Ata, Akademiia Nauk Kazakhskoĭ SSR, **1951.** 102 p. 8 figs., 14 tables, 48 refs. **DLC**—In this monograph an attempt is made to determine the possibility f vegetation on Mars from the seasonal spectral reflectivity curves obtained during 1924–1939, ompared with KRINOV's curves for seasonal variations in numerous species of terrestrial plants or rees, a large number of which are reproduced in the present work. The 4 main chapters cover: . History, II. Methodology, III. Astrobotanical work on Mars and IV. Seasonal changes in spectral eflectivity of various classes of plants, especially under the influence of heavy frost. It is shown hat the spectral reflectivity curves for the Martian "Lakes" do not conform with those for any errestrial plant species, even under conditions of severe frost. This is especially true in the infrared nd of the spectrum. Studies such as these are valuable in determining the albedo of the planet earth t different seasons. *Subject Headings:* **1. Spectral reflectivity of Mars 2. Spectral reflectivity of lants 3. Seasonal albedo variations 4. Astrobotany 5. Mars.**—*M.R.*

8G–89 551.521.14:551.463:535

Vraskiĭ, S. B., **Opticheskie svoĭstva morskoĭ vody.** [Optical properties of sea water.] *Priroda,* Moscow, 4(12):3–11, Dec. **1951.** 3 figs., eqs. **DWB**—A not very technical summary of available nowledge on the reflection of light from the surface of water, the quantitative characteristics of the ptical properties of water such as extinction, diffusion of light in water, transparency of sea water nd the color of the seas and of sea water. (*Same item as* 4.4–133, April 1953, *MAB.*) *Subject Headings:* **1. Albedo of sea surfaces 2. Optical properties of sea water.**—*I.L.D.*

1952

8G–90 551.521.32 551.509.532

Brooks, F. A., **Atmospheric radiation and its reflection from the ground.** *Journal of Meteorology,* (1):41–52, Feb. **1952.** 12 figs., 13 refs. **MH-BH**—Author discusses atmospheric transmission at arious wave lengths, energy distribution, and absorption by CO_2 and water vapor at 15°C. Results f sky radiation observations in cP air at Harvard in conjunction with slow radiosonde ascents are escribed and an integration chart for radiation frost problems constructed. Incoming radiation om the air is analyzed into block spectral bands. The spectral reflectivity of sandy loam (about)%) is examined and the upward radiation flux through a given plane above the ground represented y a diagram; quantitatively the problem is complex. A radiometer (GIER and DUNKLE, 1951) for easuring total outgoing radiation is described; it should be useful in frost forecasting. (*Same item* 3.9–125.) *Subject Headings:* **1. Spectral reflectivity of soil 2. Terrestrial radiation 3. Frost recasting 4. Radiometers.**—*C.E.P.B.*

8G–91 551.521.14:551.576

Cheltsov, N. I., **Al'bedo oblakov.** [Albedo of clouds.] *Meteorologiia i Gidrologiia,* No. 6:24–26, 52. 3 figs., 5 refs. **DLC**—The author investigated the problem on the basis of special observa- ons which were made from an airplane in 1949 over Moscow and during 1949–1950 over Ark- ngel'sk. Works previously published, especially the work by M. NEIBURGER published in 1949 **Journal of Meteorology,** have been used also. The author concluded that the albedo of clouds pends on their thickness. The clouds of crystalline structure have a greater albedo. The albedo stratus clouds is equal at different latitudes. The comparison of theoretical and observed relation tween the value of albedo and the thickness of cloud show a significant increase in water content increasing thickness. (*Same item as* 4.8–120, Aug. 1953, *MAB.*) *Subject Headings:* **1. Albedo of ouds 2. Cloud structure 3. Airplane albedo observation.**—*N. T. Zikeev.*

8G–92 551.521.6:535.8

Derksen, Willard L. and Monahan, Thomas I. (*Naval Materiel Lab., Brooklyn, N. Y.*), **A re- ctometer for measuring diffuse reflectance in the visible and infrared regions.** *Optical Society America, Journal,* 42(4):263–265, April **1952.** 5 figs. **DWB**—A simple reflectometer developed the Naval Materiel Laboratory is described. The energy reflected by a sample placed on a meter near a hemispherical mirror's center, is focused by the mirror at a point opposite from the nter of curvature, where it is measured by a Perkin-Elmer Model 12B spectrometer. The ap- ratus is described in detail and shown on a diagram and a photo. Calibration problems are cussed. The instrument was used for determining the reflectance of some common substances cluding the human skin at various degrees of pigmentation. The results of these measurements

are presented on curves showing reflectance of various material as a function of wave length of th radiation reflected (0.4–2.7μ). *Subject Headings:* **1. Reflectometers 2. Reflectance measurements** —*G.T.*

8G–93 551.593.7:523.

Dollfus, Audouin, **La courbe de polarisation de la terre et la nature du sol lunaire.** [Polarizatio curve of the earth and properties of the lunar soil.] *Académie des Sciences, Paris, Comptes Rendus* 235(18):1013–1016, Nov. 3, **1952.** 2 refs. **DWB**—The polarization curve of light reflected by th moon makes it possible to determine that of the earth, leaving only a factor which was calculate by combining the polarization of the atmosphere, of the soil and of clouds. Laws of this integratio were investigated by means of aerostat measurements. The depolarization coefficient of the luna surface is a function of albedo and corresponds to that of volcanic ash. (*Same item as* 6.10 277 Oct. 1955, *MAB.*) *Subject Headings:* **1. Polarization 2. Polarization measuring equipment 3. Al bedo of moon 4. Lunar atmosphere.**—*Trans. of author's abstract.*

8G–94 551.521.14:551.521.6

*Gates, David M. and Tantraporn, Wirojana (*Univ. of Denver, Colo.*), **The reflectivity of decidu ous trees and herbaceous plants in the infrared to 25 microns.** *Science*, 995(2997):613–616, June 1952. 4 tables, 10 refs. **DLC**—Data are given for reflectivity of infrared radiation (3–25μ) at 65 angle of incidence from 27 species of trees and shrubs, and for 20° angle of incidence for 9. Rati of reflectivity of upper to lower leaf surface is also shown, indicating that the upper surface is fro 1 to 10 times more reflective than the lower. The greatest value obtained was for the lemon le at 10μ and 65° angle (17% of mirror reflection). Waxy leaves are more reflective than nonwax Mechanism of absorption and reflection in leaves is discussed. Based on work done in the Dep of Physics at the Univ. of Denver, Colo. with a double beam Baird infrared spectrometer with a NaC or KBr prism for 3–25μ measurements. A Perkin-Elmer spectrometer with NaCl prism was use for 0.9–3.0μ data. [*See* 8G–59 for work by Krinov on "Spectral Reflectivity in 4000–9000 Å (.0 to .09μ) region.] (*Same item as* 4.4–128, April 1953, *MAB.*) *Subject Headings:* **1. Albedo of plan 2. Infrared radiation 3. Spectral reflectivity.**—*M.R.*

8G–95 551.521.1

Griesseier, H., **Zur Reflexion der Strahlung an einer unbewegten Wasseroberfläche.** [Refle tion of radiation from a calm water surface.] *Zeitschrift für Meteorologie*, 6(2):53–57, Feb. 195 3 figs., 10 refs., 13 eqs. **DWB**—Author discusses partial reflection of radiation by an infinite smoo water area. From FRESNEL's expression involving refractive index it is calculated that while vertic radiation is almost completely absorbed, the proportion falls off very rapidly (to about 5% wi sun's elevation 60°). Reflection of diffuse sky radiation is calculated, on the assumption of a unifor cloud cover, as 5.6%, in good agreement with observed values. (*Same item as* 3.9–120, Sept. 195 *MAB.*) *Subject Heading:* **1. Albedo of water surfaces.**—*C.E.P.B.*

8G–96 551.521.14:551.588.6(584) 551.451

*Iaroslavtsev, I. N. (*Tashkent Geoph. Obs.*), **Al'bedo estestvennogo pokrova pochvy v Tashkent** [Albedo of natural soil cover at Tashkent.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, N 1:85–88, **1952.** 4 figs., 2 tables, 3 refs. **DLC**—Isopleths of albedo of a field at the Tashkent O servatory based on 6 years of continuously recorded data (1945–1950) show seasonal vs. diurn variations with a minimum of <17% in May–June at 10–14 h, and a maximum of >40% in Dec Jan. (snow covered fields) from 08 16 h. By interpolation one can get the mean albedo of a hour of any day in the year. Cover changes and their effects on albedo throughout the years a shown on another curve. The monthly mean albedo for each year 1945–50 is given in a table. varies from 15% (Nov. 1945) to 61% (Dec. 1946). Snow cover is a decisive factor in winter vari bility (15%–35% in Nov., 16%–61% in Dec., 26%–55% in Jan. compared to 15%–24% in Ma Oct.). Annual means are shown to vary from 19% during a cold rainy year (1949) to 29% during very snowy year (1950). *Subject Headings:* **1. Albedo of grasslands 2. Diurnal albedo variati 3. Annual albedo variations 4. Tashkent, U.S.S.R.**—*M.R.*

8G–97 551.521.14:551.578.

Middleton, W. E. Knowles and Mungall, A. G. (*Natl. Res. Council, Ottawa*), **The lumino directional reflectance of snow.** *Optical Society of America, Journal*, 42(8):572–579, Aug. 19 6 figs. 11 refs., eqs. Also: Christie, A. W. (*Harmodsworth, Eng.*). [**Discussion**]. *Ibid.*, 43(7):621–6 July **1953.** fig., 5 refs., 12 eqs. **DWB**—By means of a specially constructed portable goniophoto eter, the directional reflectance of numerous surfaces of snow was measured during the winter 1951–1952. While some samples reflected more nearly diffusely than others, all showed mu specular reflection at high angles of incidence. An approximate theory of the specular reflectior given and its results compared with experiment. The experimental fact that the angle of maxim

reflectance is greater than the angle of incidence is explained by the theory. CHRISTIE, after elaborating on several points of the Middleton-Mungall theory, takes up the experimental determination of reflection data, especially the problems arising from the relative sizes of sample, source and receiver. He finds that the angles subtended by the source, the sample and the receiver appear to be too large in the goniophotometer of MIDDLETON and MUNGALL. Attention is also called to the fact that data obtained through the technique under review cannot be easily adapted to specific needs, for example those of aviators. (*Same item as* 4.4–141 and 6.1–168, April 1953 and Jan. 1955, *MAB.*) *Subject Headings:* **1. Spectral reflectivity 2. Albedo of snow 3. Goniophotometers.**—*G.T., Authors' abstract.*

8G–98 551.521.14

Middleton, William Edgar Knowles, **Note on the reflection of diffuse daylight from still water.** *Royal Meteorological Society, Quarterly Journal,* 78(338):627–628, Oct. **1952.** 6 refs., 5 eqs. **DWB**—Calculated reflection of light from an overcast sky of uniform luminosity gives a reflecting power of 0.066. Author recalculates this for ratios of brightness zenith/horizon 1 to 4 and finds that for the average ratio (3) the reflecting power is 0.51. (*Same item as* 4.4–130, April 1953, *MAB.*) *Subject Heading:* **1. Albedo of water surfaces.**—*C.E.P.B.*

8G–99 551.521:551.578.46:551.588.6

†Miller, David H., **Some forest influences on thermal balance over the snowpack.** *U. S. Corps of Engineers. Snow Investigations, Research Note* (unnumbered), Dec. 15, **1952.** 37 p. 66 refs. **DWB**—Data on the transmission of radiation through forests of various trunk densities and through canopies of various densities, on interception of radiation and snowfall, on albedo of snow pack within the forest, on forest albedo, on heating of forest canopy by radiation, on long wave exchange between snow and canopy, etc., were collected from literature in forestry, botany and meteorology and particularly from reports (published and unpublished) of Cooperative Snow Investigations. An attempt was made to coordinate the material coming from various sources and the results are summed up and presented in graphical form. A bibliography of international literature containing 56 papers dealing with the subject is added. (*Same item as* 4.1–119, Jan. 1953, *MAB.*) *Subject Headings:* **1. Forest thermal balance 2. Forest radiation interception 3. Albedo 4. Forest snow pack.**—*G.T.*

8G–100 551.521.14:535.4

Nimeroff, I. (*Natl. Bureau of Standards, Wash., D. C.*), **Analysis of goniophotometric reflection curves.** *Optical Society of America, Journal,* 42(8):579–583, Aug. **1952.** 3 figs., 3 tables, 12 refs., 9 eqs. **DWB**—Surface appearance, apart from texture, is defined by the goniophotometric curve giving the angular distribution of the reflected light. A summary of current goniophotometric techniques shows that essential parts of these fundamental data have been neglected. This paper applies an established method of statistics to the problem of goniophotometric-curve analysis and interpretation whereby such data are reduced to dispersion, skewness and kurtosis indexes. The kurtosis index is shown to correlate better with subjective estimates of the distinctness of the reflected images than the conventional measure, 60° specular gloss. The kurtosis index is applied to one problem in the selection of optimum glossmeter geometry. (*Same item as* 5.3–170, March 1954, *MAB.*) *Subject Headings:* **1. Albedo measurement 2. Photometry.**—*Author's abstract.*

8G–101 551.521.14

*Polli, Silvio, **Riflessione ottica di una superficia marina in condizioni naturali.** [Optical reflection of a sea surface under natural condition.] *Geofisica Pura e Applicata,* 21:142–146, **1952.** fig., 2 tables, refs. Italian and English summaries p. 142. **DLC**—FRESNEL's theory for calculating proportion of reflected/incident radiation is reviewed and results for various sun's heights (0°–90°) compared with those observed by means of Weston photocells using Schott glass filters to allow recording of comparatively monochromatic radiation. Observations were made in July–Sept. 1951 over the port of Trieste in all types of weather, sea and solar angle 10°–80°. For angles <60° the theoretical values are 2 or 3 times too low; for higher angles they are much too great. This varies slightly (50°–66°) for various colors of light, the lowest angle being for UV light, the higher for green and white. (*Same item as* 3.11–131, Nov. 1952, *MAB.*) *Subject Headings:* **1. Albedo of sea surfaces 2. Trieste.**—*M.R.*

8G–102 551.521.14:551.578.46

Sauberer, Franz, **Beiträge zur Kenntnis des Strahlungsklimas von Wien.** [Contribution to the knowledge of the radiation climate of Vienna.] *Wetter und Leben,* 4(11/12):187–192, Dec. **1952.** 8 tables, 8 refs. **DLC**—Includes comparative tables of monthly outgoing radiation values and long wave radiation balance at Vienna for snow, bare soil and the Danube's surface, under existing cloud conditions. Monthly values of albedo for the Danube surface and for meadow land are also tabu-

lated, accounting for snow cover. (*For fuller abstract, see* 5.2–137, Feb. 1954, *MAB.*) *Subject Headings:* **1. Radiation climate of Vienna 2. Albedo of snow 3. Vienna, Austria.**—*G.T.*

8G–103 551.521.14

Sivkov, S. I., **Geograficheskoe raspredelenie effektivnykh velichin al'bedo vodnoĭ poverkhnosti.** [Geographical distribution of the effective magnitudes of the albedo of water surfaces.] *Vsesoiuznoe Geograficheskoe Obshchestwo, Izwestiia*, 84(2):200–201, March/April **1952.** table, 2 refs. **DLC**—In order to calculate the effective albedo which would give not instantaneous values but daily totals of the relationship between indirect and reflected radiation over a water surface, P. P. KUZMIN proposed to consider the albedo of water surfaces as a function of the height of the sun at true noon. A table giving the annual course of the effective albedo (in percentage) of a water surface for all latitudes from 0 to 90° in 5° class intervals is presented. Equations for calculating radiation balance with the aid of this albedo are $\Sigma S_r' = A_s \cdot \Sigma S_0'$ and $\Sigma S_a' = (1 - A_s) \cdot \Sigma S_0'$ where $\Sigma S_r'$ is monthly total of reflection from water, $\Sigma S_0'$ is total monthly incident radiation, $\Sigma S_a'$ is radiation absorbed by water surface, A_s—albedo. (*Same item as* 4.6–121, June 1953, *MAB.*) *Subject Heading:* **1. Albedo of water surfaces.**—*I.L.D.*

8G–104 551.521.14:551.521.64

Winckler, J. R., **Absorption experiment to detect the cosmic-ray albedo at high altitudes.** *Physical Review*, N. Y., 85(6):1053 1054, March 15, **1952.** fig., table, 2 refs. Also his: **Application of Čerenkov radiation to the cosmic-ray albedo problem.** *Ibid.*, p. 1054–1055. fig., table, 4 refs. Review of both papers in *Uspekhi Fizicheskikh Nauk*, 48(1):131–132, Sept. **1952.** 2 figs., 4 refs. **DLC**—A Čerenkov radiation detector applied to cosmic-ray albedo measurement is described and illustrated and its efficiency is discussed (for results *see* 8G–141). *Subject Headings:* **1. Albedo for cosmic rays 2. Cosmic ray measurement.**—*G.T.*

8G–105 551.521.3

†van de Hulst, H. C. (*Univ. Obs., Leiden, Netherlands*), **Scattering in the atmospheres of earth and the planets.** (In: Kuiper, G. P. (*ed.*), **The atmospheres of the earth and planets.** Rev. ed. Chicago, Univ. of Chicago Press, **1952.** p. 49–111. figs., tables, 129 refs., eqs.) This chapter by VAN DE HULST unchanged from 1949 ed. **DWB**—Many aspects of scattering by atmospheres are discussed. Methods of measuring extinction coefficients are followed by extinction of molecules and particles as a function of wavelength and particle size. Scattering by clouds is not discussed much, except for reflection at grazing incidence. The daylight sky as related to scattering is discussed and the requirements for good measurements to test theory are itemized. Polarization, twilight phenomena, eclipses of the moon, determination of emission layers are discussed. The scattering by atmospheres follows the formation of absorption lines, and the polarization of planets is reviewed. (*Same item as* 10–89, Oct. 1950, *MAB.*) *Subject Headings:* **1. Scattering of light 2. Polarization of planets 3. Atmospheric absorption 4. Albedo.**—*S.F.*

8G–106 551.521.14:551.588.3

Baumgartner, Albert, **Das Eindringen des Lichtes in den Boden.** [Penetration of light into the soil.] *Forstwissenschaftliches Centralblatt*, Hamburg, 72 (5/6):171–184, May/June **1953.** 7 figs., 4 tables, 13 refs. **DA**—Data on light penetration measured in various soils under laboratory and natural conditions are tabulated. The graphs presented show light penetration as a function of soil particle size and wavelength. Albedo of different soils is also discussed and values found by different authors are quoted, ranging (in a dry state) from 14% for black soil to 37% for dune sand. *Subject Headings:* **1. Albedo of soil 2. Light penetration into soil.**—*G.T.*

1953

8G–107 551.521.14:551.463

Burt, Wayne V. (*Johns Hopkins Univ., Baltimore*), **A note on the reflection of diffuse radiation by the sea surface.** *American Geophysical Union, Transactions*, 34(2):199–200, April **1953.** table 7 refs., 3 eqs. **DWB**—A re-examination of average albedo of a sea surface computed theoretically by SCHMIDT (1915) and comparison of SCHMIDT's value of 17% with JUDD's theoretical value of 6.6% and measured values obtained by various investigators (including the author) reveals that a lower value should be used for sea surface albedo than the one which persistently appears in the literature. (*Same item as* 5.1–157, Jan. 1956, *MAB.*) *Subject Heading:* **1. Albedo of sea surfaces**—*G.T.*

8G–108 551.521.1

Dirmhirn, Inge, **Einiges über die Reflexion der Sonnen- und Himmelsstrahlung an verschiedenen Oberflächen (Albedo).** [The reflection of solar and sky radiation from different surface

(albedo).] *Wetter und Leben*, 5(3/4):86–94, May 1953. 10 tables, 14 refs. **DLC**—Daily means of albedo for water surfaces, ice and snow surfaces, for green vegetation stands, for soil, sand and for rocks are given. The tables give data on: 1) reflection of solar radiation and of sky radiation from water surfaces with slight wave movement at different sun elevations, 2) daily means of albedo of water surfaces for solar and sky radiation in the case of cloudless skies, 3) daily means of the albedo of water surfaces for global radiation during varying degrees of cloudiness, 4) albedo for various types of snow and ice surfaces, 5) albedo of global radiation for green fields and forests, 6) albedo of a horizontal meadow near Vienna for every month of the year and 7) albedo of sandy, clay and plowed soil and of dark and light rocks. (*Same item as* 5.2–135, Feb. 1954, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Albedo of water surfaces.**—*I.L.D.*

8G–109 551.521.14:551.578.46

Dunkle, R. V. and Gier, J. T., **Radiation in a diffusing medium with applications to snow.** California. Univ. Institute of Engineering Research, Contract DA-11-190-ENG-3, [Report], Nov. 15, **1953.** 14 p. table, 2 figs., 3 refs., eqs. **DWB**—A theoretical study of albedo (transmission and reflection) characteristics of clean snow of various ages. It is shown that melting, compaction, etc., alter the shape and size of crystals thus changing (lowering) the albedo until the limiting condition of homogeneous ice with very low albedo is reached. The transmission through an ideal snow cover is directly related to albedo in an exponentially decreasing manner. An analysis is presented with appropriate tabular data to show the correlating factors; the first parameter is characteristic of the surface snow condition and the second of the snow beneath the surface. BENFORD's (1946) results are compared with the author's in the above table. (*Same item as* 6.1–169, Jan. 1955, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Radiation transmission in snowpack.**—*M.R.*

8G–110 551.016:518.3:551.521.14

Fischer, Johannes, **Nomogramm zur Berechnung der trigonometrischen Funktion** $y = tg\beta = 2\frac{\pi}{s}\sin\left[2\pi\left(\frac{\epsilon}{\lambda}\pm n\right)\right]$. [Nomogram for calculating the trigonometric function $y = tg\beta = 2\frac{\pi}{s}\sin\left[2\pi\left(\frac{\epsilon}{\lambda}\pm n\right)\right]$.] *Acta Hydrophysica*, Berlin, 1(3):134–139, **1953.** 2 figs., 4 refs., 10 eqs. **DLC** – Construction of a nomogram, intended to facilitate the analysis of the reflection of radiation from agitated water surfaces is shown. *Subject Headings:* **1. Nomograms 2. Albedo of water surfaces.** —*A.A.*

8G–111 551.521.14

Fritz, Sigmund, **Scattering and absorption of solar energy by clouds. 1953.** Thesis (Sc.D.) Massachusetts Institute of Technology. 164 p. 12 figs. (photostat), 3 tables, 46 refs., eqs. Biographical note and list of author's publications appended. Carbon of typescript. **DWB**—Calculations of reflection and absorption of solar energy by atmospheric clouds undertaken. A simple model which retains all of the most important physical aspects is achieved by dividing the cloud into finite layers. In Pt. I the techniques are developed for a model in which absorption is negligible. Computed albedos and transmissions are compared with other theoretical results and with observations. Pt. II is devoted to computations of absorption in clouds. Formulas are derived for absorption of direct beam, from the forward-scattered beam and during the diffusion process. From these totals, absorptions and albedos are computed for 7 different infinite clouds. Results indicate that absorption by water vapor is $\frac{1}{2}$ total absorption. Ice crystal clouds and stratified deep clouds should often absorb like continuous water drop clouds. *Subject Headings:* **1. Albedo of clouds 2. Absorption by clouds 3. Atmospheric absorption.**—*From author's abstract.*

8G–112 551.521.14:551.481

Griesseier, Helmut, **Über den Einfluss der Horizontabschirmung auf die Reflexion des diffusen Tageslichts an einer unbewegten Wasseroberfläche.** [On the influence of limited horizon on the reflection of diffuse daylight from a motionless water surface.] *Beiträge zur Geophysik*, 63(2):162–165, **1953.** fig., table, 8 refs., 10 eqs. German and English summaries p. 162. **DWB**—Equations of reflection of diffuse daylight from an infinite still water surface are set out and then modified for obstructions of horizon. Albedo is reduced from 5.6% for free horizon to 2.0 for shade up to 60°. (*Same item as* 4.10–135, Oct. 1953, *MAB.*) *Subject Heading:* **1. Albedo of lakes.**—*C.E.P.B.*

8G–113 551.521.61:551.521.14:551.311.12

Sauberer, Franz, **Der Strahlungshaushalt der Alpengletscher.** [Radiation balance of the Alpine glaciers.] *Wetter und Leben*, 5(1/2):38–39, March **1953.** **DWB**—Albedo measurements on Sonnblick permitted the calculation of long wave radiation. The ÅNGSTRÖM formula gives somewhat too low and that of BOLZ and FALKENBERG somewhat too high values for counterradiation at elevation

of 9000 ft above sea level. *Subject Headings:* **1. Radiation balance 2. Albedo of glaciers 3. Sonnblick, Austria.**—*I.L.D.*

8G–114 551.521.32

U. S. Corps of Engineers, **Radiation in forest at Willamette Basin Snow Laboratory.** *U. S. Corps of Engineers, Snow Investigations Research Note,* (unnumbered), June 1, **1953.** 17 p. 7 plates, 5 tables, 12 refs. **DWB**—Radiation observations made at Willamette Basin Snow Laboratory under conditions of clear, calm and warm weather on July 8–15, 1952 are presented in detail and analyzed to show effect of forest cover on long and short wave radiation balance. About 15% of the incident radiation was transmitted through the trees. Albedo of snow patches averaged only 25%—a value considered to be excessively low because the pyrheliometers were not exposed to a continuous snow surface. Values of radiation parameters are given in tables and graphs. *Subject Headings:* **1. Radiative exchange 2. Forest radiation 3. Albedo of snow 4. Willamette Basin, Oregon.**—*M.R.*

8G–115 551.509.323:551.524.36

Williams, Thomas L., **The use of insolation in forecasting temperature.** *American Meteorological Society, Bulletin,* 34(6):245–249, June **1953.** 3 figs., 2 tables, refs. **DWB**—Accurate estimates of the albedo of clouds, the earth's surface and the atmosphere must be obtained if calculations of the radiation balance are to be used in objective forecasting of the daytime temperature. In this article a value of 0.14 has been used for a cloudless sky, and of 0.55 for an overcast sky—following Fritz (1949). A table made by substituting these values in Ångström's formula $[a=0.55n+0.14(1-n)]$, where 0.14 and 0.55 are the limiting values of the albedo for cloudiness of 0 and 1, respectively, is included. A value of 0.17 is used for albedo of earth's surface. These and other parameters were used for making forecasts for Las Vegas, Nev., and Phoenix, Ariz. Results are discussed. (*Same item as* 8C–62, March 1957, *MAB.*) *Subject Headings:* **1. Albedo utilization in temperature forecasting 2. Maximum temperature forecasting 3. Las Vegas, Nev. 4. Phoenix, Ariz.**—*M.R.*

1954

8G–116 551.521.31

Ashburn, Edward V., **Isophote charts for the visible and infrared spectral region of the cloudless day sky.** *U. S. Naval Ordnance Test Station, Inyokern, Calif. NAVORD Report,* No. 3357; NOTS, No. 932, Aug. 5, **1954.** 48 p. 81 figs. **DWB**—Isophote charts are given for the day skylight for five different zenith distances of the sun, three albedos of the ground, and six values of the extinction coefficient. The values of the extinction coefficient were chosen to apply to the visible and infrared region. The charts present the results of numerical solutions of the equations relating to Rayleigh scattering of light in the atmosphere. These equations were derived first by S. Chandrasekhar in 1950 (*see* 8G–73). *Subject Headings:* **1. Sky brightness 2. Isophote charts 3. Albedo of ground. I. U. S. Naval Ordnance Test Station, Inyokern, Calif.**—*Author's abstract.*

8G–117 551.591.3:656.71

*Barr, Norman Lee; Hussman, T. A., Jr. and Parker, J. F., Jr., **Visibility of airport runways.** *U. S. Naval Medical Research Institute, Bethesda, Research Report,* 12:435–480, Nov. 15, **1954.** 4 figs., 4 plates, 30 tables, 8 refs. **DWB**—Brightness contrast between airport runways and surrounding country was measured from an airplane on the runway and the corresponding data (both as to runway surface, length, orientation and location; and the background and contrast) tabulated for 30 airports in the East Coast states of the U. S. Instruments used were an electronic photometer mounted on a Navy R4D airplane, along with an amplifier and meter. The tables allow comparison between runways at a given airport, or between airports or types of surfaces. Best contrast is between a concrete runway and an earth background (−1,175), and grass against asphalt the poorest (0.045), seriously reducing visibility. Brightness contrast is more important at a distance than color contrast, but color and texture become important at close range. (*Same item as* 8.4–60, April 1957, *MAB.*) *Subject Headings:* **1. Brightness contrast 2. Runway visibility 3. Runway contrast 4. Albedo on runways.**—*M.R.*

8G–118 551.521.14:551.521.31

Blackwell, M. J.; Eldridge, R. H. and Robinson, G. D., **Estimation of the reflection and absorption of solar radiation by a cloudless atmosphere from recordings at the ground, with results for Kew Observatory.** *Great Britain. Meteorological Research Committee, M.R.P.* 894, Dec. 7, **1954.** 19 p. 12 figs., 9 tables, 19 refs. Mimeo. **DWB**—Records on cloudless occasions at Kew in 1947–51 of total, direct and diffuse radiation (total and two spectral regions) and illumination on a horizontal surface are discussed, including effect of London smoke with E. winds. Attenuation of radiation by Rayleigh scattering and "Fowle" (particulate) scattering and by water absorption, and diffuse radiation, are computed by several methods for a model atmosphere. Results are

compared with those given by the extra-terrestrial distribution of solar radiation proposed by NICOLET and known attenuation of an unpolluted atmosphere. The results are consistent if the measured illumination is reduced by 5%. Absorption is estimated as rather less than 10% with another 10% for "grey" multiple scattering. Albedo of cloudless atmosphere (total and various wave lengths) is plotted against sine of solar altitude. (*Same item as* 6.6–195, June 1955, *MAB.*) *Subject Headings:* **1. Albedo of atmosphere 2. Kew, Eng.**—*C.E.P.B.*

8G–119 551.578.46:551.521.14

Budyko, M. I.; Berliand, T. G. and Zubenok, L. I., **Teplovoĭ balans poverkhnosti zemli.** [Heat balance of the earth's surface.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geogr.*, No. 3:17–41, **1954.** 10 figs., 3 tables, 34 refs., 10 eqs. **DLC**—Also abridged Polish version: Molga, M., **Bilans cieplny powierzchni ziemi.** *Przeglad Meteorologiczny i Hydrologiczny*, Warsaw, 8(1):75–90, **1955.** 5 figs., table, 7 refs., 10 eqs. **DWB**—Thermal and radiation balance of the earth is calculated from total radiation, albedo and various types of heat exchange. Albedo values assumed are: 80% for permanent snow cover in high latitudes; 70% for permanent cover in temperate latitudes, 45% for intermittent cover; 18% for forests and prairies, 25% for arid grassland, 30% for deserts and 10% for water surfaces. (*Same item as* 7H–61, Aug. 1956, *MAB.*) *Subject Headings:* **1. Heat balance of earth's surface 2. Albedo.**—*G.T.*

8G–120 551.521.14(26)

Burt, Wayne V., **Albedo over wind-roughened water.** *Journal of Meteorology*, 11(4):283–290, Aug. **1954.** 3 figs., 2 tables, 33 refs., 16 eqs. **DWB**—Using statistical time distribution of surface slope of rough water, and FRESNEL's reflection laws, author computes reflection of direct solar radiation as function of solar elevation and wind speed; effect of wind is most pronounced at low solar elevations. Albedo for diffuse light is taken to vary from 0.055 to 0.066 depending on wind. For clear skies a turbidity factor is used to determine ratio of direct to diffuse radiation. For cloudy skies an analogous factor is postulated arbitrarily. Comparison with measurements at Lake Hefner shows good agreement. Albedo is found to increase with wind speed for medium solar elevations, and to decrease with increasing wind speed for low solar elevations. (*Same item as* 6.1–167, Jan. 1955, *MAB.*) *Subject Headings:* **1. Albedo of water surface. 2. Direct and diffuse radiation 3. Wind speed 4. Zenith distance 5. Lake Hefner, Okla.**—*S.F.*

8G–121 551.521.16:551.593.7

*Chandrasekhar, Subrahmanyan and Elbert, Donna D. (*both, Yerkes Obs., Chicago Univ.*), **Illumination and polarization of the sunlit sky on Rayleigh scattering.** *American Philosophical Society, Philosophical Transactions, New Ser.*, 44(6):643–729, Dec. **1954.** 11 figs., 12 tables, 11 refs., 35 eqs. **DLC, DWB**—Covers the theoretical solution of the problem of intensity of diffuse reflection and transmission of a parallel beam of radiation in a given state of polarization incident on a plane-parallel atmosphere of optical thickness τ, in some specified direction, or the degree of polarization of the same. Reflected light affects planetary illumination calculations, while transmitted light affects sky illumination. The effect of ground reflection is also formulated. The main part of the monograph consists of elaborate tables for calculating values of the various functions for $\tau_1 = 0.05$, 0.10, 0.15, 0.20, 0.25, 0.50, 1.00, and the illumination and polarization of sunlit sky for various zenith distances, and the calculation of positions of neutral points, etc. *Subject Headings:* **1. Sky light illumination tables 2. Polarization tables 3. Albedo 4. Neutral points.**—*M.R.*

8G–122 551.521.14:551.463

Czepa, Otto, **Über die spektrale Reflexion der Globalstrahlung an Wasseroberflächen.** [Spectral reflection of global radiation from water surfaces.] *Acta Hydrophysica*, Berlin, 1(4):172–177, **1954.** fig., 6 refs., 7 eqs. **DLC**—A graph shows how the albedo of motionless water surfaces varies from 400 to 760 mμ, depending on solar height. The albedo is 4 to 12% at solar height ranging from 50 to 20°, only slightly depending on wavelength and increases from 10 to 29% for 10°. Underlying theory and substantiating experiments are explained. *Subject Heading:* **1. Albedo of water surfaces.** —*A.A.*

8G–123 551.521.14

*†Danjon, André (*Dir., Obs. de Paris*), **Albedo, color, and polarization of the earth.** (In: Kuiper, Gerard P. (*ed.*), **The earth as a planet.** Chicago, Univ. of Chicago Press, **1954.** p. 726–738. 4 figs., table, 23 refs., eqs.) **DLC**—The visual albedo of the earth as determined from earth shine varies with the seasons from 0.52 (Oct.) to 0.32 (July) with an average value of 0.40. Variations in cloudiness may account for most of the seasonal variations. FRITZ reports that albedo of clouds alone is about 0.5, which is in keeping with maximum value given above. FRITZ also states that French estimates by DANJON did not consider the vast area of the Pacific, nor latitudinal variations in cloudiness. According to DANJON colorimetric observations of the earth light show it to be bluish,

but it changes seasonally and also there are random changes. The brighter the earth light, the bluer it is, except for the random changes, which occur a few days before full moon (from France) and are probably due to reflection from the Atlantic Ocean area. Polarization varies over land, sea and clouds. Resulting polarization for phase angle of 90° is about 36% but varies with phase. Comparison is made with the parallel conditions in Mercury, Venus and the Moon. *Subject Headings:* **1. Albedo of earth 2. Earthshine 3. Color of earthshine 4. Polarization of earthshine.**—*M.R.*

8G–124 551.521.1(68/691)

Drummond, A. J. and van Deventer, E. N., **The atmospheric transmission of solar energy over southern Africa.** *South Africa, Weather Bureau, Notos*, 3(4):272–286, **1954.** 4 figs., 6 tables, 12 refs. **DWB**—A description of the radiation program in South Africa and an integrated analysis of the various aspects of solar radiation depletion by the atmosphere over S. and E. Africa, based on data from 8 stations (Nairobi, Windhoek, Pretoria, Bloemfontein, Durban, Cape Town, Mt. Brukkaros and Tananarive) for periods from 10 mo to 6½ yrs, and comparison with data for sections of the U. S., Europe, Indonesia, and other areas. Study includes details of global and diffuse short wave radiation, solar constant for latitude of South Africa, albedo (surface of earth 13% on clear days in Feb. and June, 7% on cloudy days, total albedo of earth and atmosphere 20%, 22% and 36%, respectively). (*Same item as* 6.10–154, Oct. 1955, *MAB.*) *Subject Headings:* **1. Radiation climate 2. Albedo 3. Solar radiation networks 4. South Africa.**—*M.R.*

8G–125 551.521.3:551.576

*Fritz, Sigmund, **Scattering of solar energy by clouds of "large drops."** *Journal of Meteorology*, 11(4):291–300, Aug. **1954.** 6 figs., 4 tables, 20 refs., 23 eqs. **DWB**—Absorption is considered negligible as in visible or ultraviolet light. The amount of diffuse (nearly isotropic) energy generated from the direct solar beam and "forward scattered" energy is calculated as a function of depth below the cloud top. The "diffuse generated" energy is diffused according to a simple diffusion equation, in analogy with neutron diffusion theory. The albedo of clouds is thus computed as a function of cloud thickness, cloud parameters, solar zenith distance, and albedo of the underlying surface. For thin clouds, a large effect of sun's zenith distance, Z is reported; for "optical thickness" equal to 1, the albedo is about 0.08 for $Z=0°$, and about 0.64 for $Z=80°$ when the ground albedo is zero. Comparison with NEIBURGER's measurements over stratus, shows that 45% of the observed albedo variation for thin clouds can be attributed to change in Z. (*Same item as* 6.2–170, Feb. 1955, *MAB.*) *Subject Headings:* **1. Albedo of clouds 2. Zenith distance 3. Diffusion theory.**—*S.F.*

8G–126 551.521.14

*Gier, J. T. and Dunkle, R. V., **Spectral reflectivity of certain minerals and similar inorganic materials.** California. Univ. Institute of Engineering Research, Contract DA 11-190-ENG-3, (Report), Jan. 29, **1954.** 15 p. numerous tables, 5 refs. **MH-BH**—The problem of spectral reflectivity of the earth's surface is intimately tied up with the spectral reflectivity of various minerals which comprise the solids in various places, as well as with the reflectivity of snow, water, vegetation, etc. To get at this fundamental problem the reflectivities of numerous mineral powders or dusts have been tested in the region from 1μ to 15μ, and the data tabulated and compared with that obtained for certain minerals (quartz, calcite and flourite) by other authors. The technique used is described (heated cavity reflectometer which measures the energy reflected from a water-cooled sample mounted in an ideal radiator and passed through a Perkin-Elmer Infrared Spectrometer). *Subject Headings:* **1. Spectral reflectivity of minerals 2. Albedo of earth's surface.**—*M.R.*

8G–127 551.521.14:551.508.99

Gier, Joseph T.; Dunkle, Robert V. and Bevans, Jerry T. (*Calif. Univ., Berkeley*), **Measurement of absolute spectral reflectivity from 1.0 to 15 microns.** *Optical Society of America, Journal*, 44(7): 558–562, July **1954.** 8 figs. **MH-BH**—A device that can be used for the measurement of the absolute spectral reflectivity or reflectance of metals, paints, etc. is described. The unit is used in conjunction with a Perkin-Elmer Model 83 monochromator equipped with an NaCl prism for the wavelength range 1.0 to 15.0 microns. Preliminary results for MgO, polished copper, molybdenum, and electrolytic gold are presented. (*Same item as* 6.2–162, Feb. 1955, *MAB.*) *Subject Headings:* **1. Spectral reflectivity 2. Albedo 3. Monochromators.**—*Authors' abstract.*

8G–128 551.521.14:551.463

Griesseier, H., **Über die Reflexion der diffusen Himmelsstrahlung an einer unbewegten Wasseroberfläche.** [Reflection of diffuse sky radiation from a still water surface.] *Acta Hydrophysica*, Berlin, 2(2):35–42, **1954.** 6 refs., 32 eqs. **DLC**—Author agrees with a recently revised criticism by MIDDLETON, showing that his earlier paper (*Zeit. fur Met.*, 6:53, 1952; *see* 8G–95) gives a wrong total reflection capacity of 5.6% for a water surface, while the right value is 6.5%. The theoretica

analysis is corrected leading to a rather complicated set of equations. The numerical results are practically identical with values communicated by MIDDLETON. *Subject Headings:* **1. Albedo of water surfaces 2. Diffuse radiation. I. Middleton, W. E. K.**—*A.A.*

8G–129 551.521.14:551.521.3

Härtel, Otto (*Graz*), **Über spektrale Veränderungen des Lichtfeldes durch die Vegetation, 1. Mitteilung.** [On the spectral change of light field through vegetation, Pt. 1.] *Wetter und Leben*, Vienna, 6(5/6):118–122, Aug. **1954.** fig., 4 tables, 8 refs. **DLC**—Light measurements were carried out on differently oriented rows of plants at Ischia, in the Gulf of Naples, in order to determine the microclimatic role of radiation reflection from the ground. The orientation of the plant rows was such as to obtain a maximum ecological advantage from the incident radiation during the highest temperature of the day. A homogeneous light field is obtained so that the plants are exposed to different wave lengths. Photosynthetically effective wave lengths are used during forenoon hours and too high infrared absorption is avoided during the warmest part of the day. (*Same item as* 6.8–224, Aug. 1955, *MAB.*) *Subject Headings:* **1. Albedo of vegetation 2. Absorption of terrestrial radiation 3. Plant microclimatology 4. Ischia, Italy.**—*I.L.D.*

8G–130 551.521.14:633.51

Hank, Olivér and Vásárhelyi, József, **A talaj szinének hatása a gyapot fejlődésére.** [Effect of soil color on the development of cotton.] *Idojárás*, 58(3):137–143, May–June **1954.** 8 figs., 4 tables, 3 refs. **MH-BH**—The preliminary experiment reported in this paper involved treatment of experimental cotton fields with white and black powder. Comparative data on air and soil temperatures and on plant development are presented for the untreated, black and white fields. The white field is found to have yielded the best crop while the black field favored growth of stalk and leaves. (*Same item as* 6.2–163, Feb. 1955, *MAB.*) *Subject Headings:* **1. Albedo of soil 2. Plant physiology 3. Cotton crop yields.**—*G.T.*

8G–131 551.586:612.014.43:636 551.521.3

Kelly, C. F.; Bond, T. E. and Heitman, Hubert, Jr. (*Calif. Univ., Davis*), **The role of thermal radiation in animal ecology.** *Ecology*, 35(4):562–569, Oct. **1954.** 9 figs., refs. **DLC**—The rate of heat loss from cattle, with special reference to the role of radiation in the heat balance as compared with conduction, convection and evaporation, is investigated. The mode of heat loss in swine under controlled conditions with air temperature being equal to wall temperature is discussed and radiant heat load imposed upon a Hereford cow under natural conditions measured with a Gier radiometer and under shaded and unshaded conditions is analyzed. The relation between an animal and its radiational environment is examined with reference to the amount and quality of radiation reaching the animal, and the amount of radiation reflected and absorbed by the animal and the reflectance and absorption of radiation by swine is considered. (*Same item as* 6.9–302, Sept. 1955, *MAB.*) *Subject Headings:* **1. Thermal balance of animals 2. Albedo of animals 3. Atmospheric absorption 4. Heat loss.**—*I.L.D.*

8G–132 551.521.14

†*Kondrat'ev, K. Ia., **Luchistaia energiia solntsa.** [Radiant energy of the sun.] Ed. by P. N. Tverskoĭ. Leningrad, Gidrometizdat., **1954.** 599 p. 267 figs., 219 tables. bibliog. p. 571–590, numerous eqs. **DLC** (QC912.K6)—This book on solar radiation has the most thorough treatment of albedo of any textbook extant. Ch. 9 (p. 440–488) covers successively the albedo of: 1) various types of land surfaces, (soil, vegetation, snow, ice, diurnal variation, annual variation, measurement from airplanes, etc.); 2) water basins (for direct radiation, for rough water surfaces, and for diffuse radiation); 3) albedo of towns; 4) albedo in spectral regions (spectrophotometry, use of filters); 5) cloud albedo; 6) albedo of earth as a planet and 7) methods of computing means and geographic variations in albedo. The literature on albedo is thoroughly reviewed and the text amply supported by selected tabular data for each aspect. Maps of the U.S.S.R. give seasonal and annual isopleths of albedo, and a table gives mean monthly albedo for every 5° of lat. for the earth as a whole. Albedometers, especially the Ianishevskiĭ type, are described and the theory elaborated on p. 61–65. (*Same item as* 8.5–8, May 1957, *MAB.*) *Subject Headings:* **1. Albedo 2. Albedo data 3. Albedo maps 4. U.S.S.R. I. Tverskoĭ, P. N.** (*ed.*) **II. Ianishevskiĭ, Iu. D.**—*M.R.*

8G–133 551.593.7:551.521.14

Lange, Otto D., **Die Polarisationsgrösse p in ihrer Abhängigkeit von Instrumentenhöhe und Albedo.** [The dependence of polarization magnitude p upon instrument height and albedo.] *Zeitschrift für Meteorologie*, 8(4):97–111, April **1954.** 11 figs., 7 tables, 10 refs., 13 eqs. **DWB**—After establishing the approximation formula for the variability of the polarization value p, the integral functions F_1 and F_2, which are dependent upon the earth's atmospheric pressure H_e for certain H_e means, were computed, the air pressure at the place of observation being $H_b = 760$ mm Hg.

The constants which were not indicated but occurred in F_1 and F_2 were determined graphically. The change of p with H_e, i.e., stationary height of the polarimeter over the earth's surface Z_0, is minor at limited instrument height and should be disregarded. To formulate this change as well as that of the arguments of sun height α, and sun distance ϕ, albedo of the earth's surface μ and pressure at the place of observation is rather complicated. For the maximum polarization, ϕ is the constant, for the zenithal polarization, a function of α, so that p in the first case does not change with ϕ and in the second case under the consideration of $\alpha = 90° - \phi$ these changes coincide completely. The variability of polarization value with α and μ has been tabulated while those of the H_b will be computed at a later date. (*Same item as* 6.6–330, June 1955, *MAB.*) *Subject Headings:* **1. Polarization 2. Albedo 3. Instrument exposure.**—*Trans. from author's abstract.*

8G–134 551.521.14:77:535.3

MacAdam, D. L., **Reproduction of colors in outdoor scenes.** *Institute of Radio Engineers, Proceedings*, 42(1):166–174, Jan. **1954.** 21 figs., 15 refs. **DWB**—A great deal of spectrophotometric and colorimetric data (albedo or spectral reflectance curves) on various colors of skin, hair, grass, foliage, sky and earth is presented for use in outdoor color television work. Differences between albedo of men and women, blonds and brunettes, old and young are strikingly shown for various wave lengths from 4000 to 7000 Å and compared with that of green leaves. An interesting chart shows relations between leaves, earth, blue or red sky, water, brick and distance of objects in daylight (from HENDLEY and HECHT, 1949). (*Same item as* 6.2–164, Feb. 1955, *MAB.*) *Subject Headings:* **1. Albedo 2. Spectral reflectance data 3. Color photography.**—*M.R.*

8G–135 551.521.14:551.463

Neiburger, Morris (*Univ. of Calif. at L. A., Dept. of Met.*), **A note on the reflection of diffuse radiation by the sea surface.** *American Geophysical Union, Transactions*, 35(5):729–732, Oct. **1954.** fig., 3 tables, 6 refs., 4 eqs. **DWB**—The measurements of the fraction returning upward of the downward radiation at various levels below stratus cloud, which were presented by the author in 1948, gave larger values than 0.066, the theoretical value for the reflectivity of a plane water surface. By fitting a regression curve to the data at various elevations, it is shown that the effect of haze below the point of observation can explain only part of the difference, and that the average fraction returning upward at the sea surface is probably 0.095. POWELL and CLARKE's measurements show that scattering by bubbles and particulate matter is probably sufficient to account for the difference between this value and the theoretical value. The particle-size distribution required to give the observed variation of albedo with height is computed and shown to be consistent with the expected distribution above the sea surface. (*Same item as* 6.8–225, Aug. 1955, *MAB.*) *Subject Headings:* **1. Albedo of sea surfaces 2. Diffuse radiation.**—*Author's abstract.*

8G–136 551.521.11:551.576.2

Neumann, J. (*Israel Met. Service, Tel Aviv*), **Insolation in relation to cloud amount.** *Monthly Weather Review*, 82(11):317–319, Nov. **1954.** 4 refs., 10 eqs. **DWB**—Assuming a simple pyrheliometric station model, an equation is derived relating the amount of insolation Q from a sky whose fraction C is covered by clouds, to the insolation Q_0 arriving at the same surface from a cloudless sky. The equation is of the form: $Q/Q_0 = 1 - (A - a)(1 + a)C$, where A is the sum of cloud albedo and absorptivity expressed as fraction of the radiation incident on cloud tops and the symbol a represents the depletion coefficient of insolation in cloudless air in the layer between cloud top and cloud base levels. The theoretical equation resembles the empirical equation $Q/Q_0 = 1 - kC$ where k is supposed to be a constant. The theoretical equation shows the dependence of k on relevant physical variables. It is shown that the theoretical equation combined with results of pyrheliometric observations, from which a value of k has been deduced, leads to a value of A which is in close accord with its value obtained by independent methods. On the other hand, if we assume reasonable values for A and a, the resulting value for k is in good agreement with the best value found from pyrheliometric observations. (*Same item as* 6.9–175, Sept. 1955, *MAB.*) *Subject Headings:* **1. Insolation 2. Cloudiness effects on insolation 3. Albedo of clouds.**—*Author's abstract.*

8G–137 551.506.5:551.311.12(987) 551.573

†*Orvig, Svenn (*Dir. Montreal Off., Arctic Inst. of North America*), **Glacial-meteorological observations on icecaps in Baffin Island.** *Geografiska Annaler*, Stockholm, 36(3/4):197–318, **1954.** 44 figs. (incl. photos), 14 tables, numerous foot-refs., bibliog. p. 312–318, eqs. **DLC**—A major monograph presenting results of observation on the Baffin ice caps in May Sept. 1953 by the Second Baffin Island Expedition. The first Baffin Island Expedition in 1950 measured glacio-meteorological conditions at edge of Barnes Ice Cap, and the second expedition on Cumberland Peninsula. The ice cap station at 6725 ft was operating May 21 to Aug. 9 with bi-hourly observations from 0800 to 2000 h of pressure, temperature at 3, 13 and 23 ft height, humidity at 3 ft, wind speed at 6 ft, clouds, fog, visibility and ceiling. Maximum and minimum temperatures and precipitation at 08, 14 and

20 h, snowfall, rain, and sunshine were also measured. Continuous recordings of pressure, temperature and humidity and incoming short wave radiation were made for 80 days. Spot measurements of net radiative flux and of incoming and outgoing short wave radiation were made occasionally with special radiometers. Radiation, sunshine and albedo are discussed in Ch. 4, ablation in Ch. 5, and heat exchange in Ch. 6. Finally, a comparison is made between ablation factors calculated on 10 expeditions from 1931 to 1953 on different glaciers. Radiation, convection and conduction, and condensation factors in ablation show wide variation in percentages at these places. Of course surfaces vary from snow to ice and elevations from 5 m to 3000 m, while latitude varies from 46°N to 80°N. An extensive bibliography is appended. (*Same item as* 7.2–24, Feb. 1956, *MAB.*) *Subject Headings:* **1. Baffin Island Expedition, Second, 1953 2. Glacier-meteorological observations 3. Ablation factors 4. Albedo of glaciers 5. Penny Ice Cap, Baffin Island 6. Padloping Island, Canada.**—*M.R.*

8G–138 551.501:551.521.14

Portman, Donald J., **The measurement of radiation.** *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology,* 7(2):289–292, **1954.** 2 figs., 3 tables, 2 refs. **DWB**—Short description of radiation measurement, made in connection with micrometeorological observations. The net radiation was measured with a Gier and Dunkle instrument combined with a recording system. A 10-junction Eppley pyrheliometer with a micromax recorder was used for solar radiation. The albedo, measured with a pyrheliometer was from 0.055 for wet soil up to 0.162 for dry soil. Very wet soil (after thawing) had an albedo of 0.23 and snow 0.69–0.74. (*Same item as* 7.7–154, July 1956, *MAB.*) *Subject Headings:* **1. Albedo measurement 2. Albedo of soil 3. Albedo of snow.** —*A.A.*

8G–139 551.521.14:551.576

Sauberer, Franz, **Zur Abschätzung der Gegenstrahlung in den Ostalpen.** [The evaluation of atmospheric radiation in the eastern Alps.] *Wetter und Leben,* Vienna, 6(3/4):53–56, June **1954.** 4 tables, 7 refs. **DLC**—A formula for determining atmospheric radiation in the eastern Alps, taking into consideration cloudiness, is proposed. This formula is: $G_w = G_0 + \sigma T^4 kw - G_0 kw$, where G_w = atmospheric radiation during cloudiness (in tenths); G_0 = atmospheric radiation during zero cloudiness; w = cloudiness in tenths of sky surface, k = parameter for cloudiness type. Tables give parameter k, annual variations and daily radiation total of atmospheric radiation for different cloudiness amounts as a function of elevation above sea level. (*Same item as* 6.7–199, July 1955, *MAB.*) *Subject Headings:* **1. Atmospheric radiation 2. Albedo of clouds 3. Eastern Alps.**—*I.L.D.*

8G–140 551.508.2:535.245:634.94

Shipman, Robert D., **Simple aid to instantaneous measurement of light intensity.** *Journal of Forestry,* Wash., D. C., 52(8):605–606, Aug. **1954.** photo. **DWB**—Light intensity is measured with a photometer or photoelectric cell, which measures the light reflected under the forest from a surface canopy, and is expressed as percent of the light reflected in full sunlight in the open. A Weston meter is mounted on a holding device above a sheet of white paper 17″×22″ and 12″ below the cell. This is portable and can be used at different times of the day, under different cloud and canopy conditions. It only measures light reaching the forest floor, not the crowns. (*Same item as* 6.9–103, Sept. 1955, *MAB.*) *Subject Headings:* **1. Albedo of forest floor 2. Photoelectric cells 3. Albedometers.**—*M.R.*

8G–141 551.508.25:551.521.14

Winckler, J. R. and Anderson, K. (*Univ. of Michigan*), **Geomagnetic and albedo studies with a Čerenkov detector at 40° geomagnetic latitude.** *Physical Review,* 93(3):596–605, Feb. **1, 1954.** 14 figs., table, foot-refs., 2 eqs. **DWB**—A Čerenkov detector consisting of a Lucite radiator optically sealed to a large-area side-window photomultiplier has been flown at $\lambda = 40°$ at a depth of 25 g/cm² below the top of the atmosphere. The albedo was determined and is not more than 5% of the incident flux for particles of $\beta > 0.7$ in any upward direction. The albedo observed is too small to account for the factor-of-two difference between the observed E–W asymmetry and that predicted from the primary spectrum and geomagnetic theory. Direct asymmetry measurements by the Čerenkov counter suggest that the earth shadow cone cutoff may start at larger zenith angles than theoretically predicted. A very rough relative abundance measurement of H:He:Li gives 1:0.08:0.02. *Subject Headings:* **1. Čerenkov radiation counters 2. Albedo for cosmic rays.**—*Authors' abstract.*

1955

8G–142 551.521.14:551.311.12

Dirmhirn, Inge and Trojer, Elfriede, **Albedountersuchungen auf dem Hintereisferner.** [Albedo investigations on the Hintereis Glacier.] *Archiv für Meteorologie, Geophysik und Bioklimatologie,*

Ser. B, 6(4):400–416, **1955.** 8 figs., table, 18 refs. German, English and French summaries p. 400–401. **DWB.** Summary in *Wetter und Leben*, Vienna, 7(8/11):209, **1955.** **DLC**—The mean albedo of snow and ice on Aug. 23–Sept. 3, 1954, at 2400–2600 m on Hintereis Glacier (Oetztal) was: dry new snow 0.816, wet 0.740, old snow 0.724; dry firn 0.634, wet 0.539, dirty 0.457; clean glacier ice 0.410, dirty 0.228. The diurnal variation gave a minimum at 1–3 p.m. on clear days (most melting). Calculations are made of the mean albedo of the glacier; after 6 fine days it decreased from 0.70 to 0.45. (*Same item as* 7G–205, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of glaciers 2. Albedo of snow 3. Oetztal, Austria.**—*C.E.P.B.*

8G–143 551.593:551.578.4:551.521

Dunkle, R. V. and Gier, J. T., **Snow Characteristics Project.** California Univ. at Berkeley Institute of Engineering Research, Contract DA-11-190-ENG-3, Final Progress Report, Aug. 31 **1955.** 122 p. numerous figs. and tables, 21 refs., 33 eqs. **DWB**—This report presents results of research into spectral reflectivity in infrared and visible, total emissivity, snow transmission and albedo, freezing and thawing of soil, using old as well as developing new instruments for measuring and testing the theory in the Donner Summit area of the Sierras. Analysis, review of literature and theory, and description of equipment occupies the report, to which is appended extensive samples of data and records, both original and compiled, and photos of equipment. (*Same item as* 7G–206, July 1956, *MAB.*) *Subject Headings:* **1. Optical properties of snow cover 2. Snow transmissivity 3. Albedo of snow 4. Donner's Summit, Calif.**—*M.R.*

8G–144 551.521.14:551.521.1

Fritz, Sigmund (*U. S. W. B., Wash., D. C.*), **Illuminance and luminance under overcast skies.** *Optical Society of America, N. Y., Journal*, 45(10):820–825, Oct. **1955.** 7 figs., 3 tables, 16 foot-refs., eqs. **DLC**—The illuminance of a horizontal surface at the ground below an overcast sky is computed. The transmittance, T, of visible light is given as a function of the cloud optical thickness, h/L, of the sun's zenith distance, Z, and of the reflectance, a, of the underlying surface. For some cloud thicknesses, T varies markedly with Z. Also, for thick clouds, T is several times larger over a fresh snow cover than it is over snow-free ground. A formula for luminance distribution, $B(\theta)$, of a heavily overcast sky is presented. This formula agrees fairly well with existing measurements made over snow-free terrain; however, it further suggests that $B(\theta)$ will become much more uniform when a fresh snowfall uniformly covers the ground. (*Same item as* 7.6–132, June 1956, *MAB.*) *Subject Headings:* **1. Luminance 2. Illuminance 3. Albedo under overcast skies 4. Albedo of snow.**—*Author's abstract.*

8G–145 551.521.14:551.311.1

Hoinkes, H. (*Innsbruck*), **Über den Wärmehaushalt horizontaler Gletscherflächen in den Alpen.** [Heat balance of horizontal glacier surfaces in the Alps.] *Berlin. Freie Universität Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 2(4):53–62, **1955.** 2 tables, 7 refs. **DWB**—The complicated problem of measurement of the energy balance at a point over a glacier is treated in theory, and measurements made during daytime and at night, respectively, by the author and collaborators in the Hornkees (Zillertaler Alps, 2262 m) in Sept. 1951, and on Vernagtferner (Ötztaler Alps, 2973 m) in Aug. 1950 and July 1952 are summarized in tabular form and discussed. Energy from radiation balance, evaporation, condensation, convection, rain and total absorption, amount of water from melting and evaporation, and the ablation both calculated and observed are included. Good agreement is noted for both energy balance and water content by theory and measurement. It was found that on a fair day in summer, a glacier surface with an albedo of 0.37 absorbed 350 cal/cm² in 24 hrs. Short wave radiation comprises 70–80% of the absorbed energy on a fine summer day. Energy from rain, evaporation and condensation are almost negligible on summer days (1 to 8%) but can be appreciable at night and at other seasons. (*Same item as* 7.7–153, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of glaciers 2. Glacial ablation 3. Vernagtferner Glacier, Alps 4. Hornkees Glacier, Alps.**—*M.R.*

8G–146 551.521.14:551.578.46

Hubley, Richard C., **Measurements of diurnal variations in snow albedo on Lemon Creek Glacier, Alaska.** *Journal of Glaciology*, 2(18):560–563, Oct. **1955.** 2 figs., 6 refs. English and German summaries p. 560. **DWB**—Summer measurements of incoming and reflected solar radiation were made with Eppley pyrheliometers on Lemon Creek Glacier, Alaska. On clear days albedo varied from nearly .9 (morning) and .82 (afternoon) to about .65 from 9–15 h. On cloudy days albedo near midday was .75 to .8, varying inversely with height of cloud layers. Dry powdery snow is a diffuse reflector nearly independent of solar angle, but recrystallization of old snow introduces specular reflection. [This work has been reappraised, *see* 8G–172]. (*Same item as* 7.2–156, Feb 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Lemon Creek Glacier, Alaska.**—*C.E.P.B.*

8G–147 551.579.2

Ishii, Sachio (*Sapporo, Japan*), **On some mechanisms of snow-melt.** *Researches on Snow and Ice*, Tokyo, No. 2:53–61, Jan. **1955.** 4 figs., 2 tables, 9 refs., 4 photos, eqs. In Japanese. **DWB**—The process of snow melting and the melting rate are discussed, considering structure of the snow cover (snow sampler is described and illustrated; photomicrographs of arrangement of crystals in various types of snow cover are presented), albedo of snow and amount of heat supply (degree-days). (*Same item as* 7H–67, Aug. 1956, *MAB.*) *Subject Headings:* **1. Snow melt 2. Albedo of snow.** —*G.T.*

8G–148 551.521.14:551.521.61:551.508.25

Jacquez, John A.; McKeehan, Wayne; Huss, John; Dimitroff, James M. and Kuppenheim, Hans F. (*all, Army Medical Research Lab., Fort Knox, Ky.*), **An integrating sphere for measuring diffuse reflectance in the near infrared.** *Optical Society of America, N. Y., Journal*, 45(10):781–785. Oct. **1955.** 2 figs., 5 tables, 11 foot-refs. **DLC**—The construction and performance of a $4\frac{1}{4}$-in, diameter comparison type integrating sphere for a spectrophotometer designed by W. L. DERKSEN and T. I. MONAHAN is described. This combination allows the measurement of diffuse spectral reflectance in the near infrared to 2.6μ with an accuracy of 1%. *Subject Headings:* **1. Spectrophotometers 2. Spectral reflectance measurements 3. Infrared spectrophotometry.**—*Authors' abstract.*

8G–149 551.521.14:551.463

Kondrat'ev, K. IA. and Kudriavtseva, L. A., **K voprosu ob al'bedo poverkhnosti moria.** [Albedo of the sea surface.] *Meteorologiia i Gidrologiia*, Moscow, No. 3:25–27, May/June **1955.** fig., table, 2 refs., 2 eqs. **DWB**—Since FRESNEL'S formula for calculating theoretically the albedo from oceans, seas and lakes is valid only for direct solar radiation, the author presents the results of calculations of albedo of a smooth sea surface for diffuse and total radiation in the case of a cloudless sky. Counterradiation was not taken into account. The formula $A = 0.027 + 0.0002\zeta e^{4.98 \times \left(\frac{\pi}{2} - h_0\right)}$ is recommended for the calculation of albedo from smooth water surface. (*Same item as* 7.10–169, Oct. 1956, *MAB.*) *Subject Headings:* **1. Albedo of sea surfaces 2. Diffuse radiation.** —*I.L.D.*

8G–150 551.521.14

†Lauscher, Friedrich, **Sonnen- und Himmelsstrahlung im Meer und in Gewässern.** [Sun and sky radiation in sea and in bodies of water.] *Handbuch der Geophysik*, Berlin, 8(4):723–768, **1955.** tables, diagrs., 32 refs., eqs. **DWB**—A systematic mathematical presentation of the physical laws underlying the phenomena of the refraction of solar and sky light in bodies of water and of the most important methods of measurement. The discussion includes the penetration of radiation energy into water and air; refraction indices; reflection of solar radiation from a water sphere; daily variation and daily totals of solar radiation reflection; reflection of radiation issuing from the water; reflection at the bottom of the water; reflections from water surfaces set in motion by waves; observations of reflection absorptions and penetration of radiation into water; absorption and diffuse reflection from suspended particles; scattering by absolutely pure water; absorption by pure water; absorption of dissolved substances; total extinction; refraction of the primary and of the secondary light from below; methods of measurement and some results of spectral measurements. (*Same item as* 6.11–214, Nov. 1955, *MAB.*) *Subject Headings:* **1. Albedo of sea surface 2. Radiation measurement 3. Sky radiation.**—*I.L.D.*

8G–151 551.578.46:551.521.1(794)

§*†Miller, David H., **Snow cover and climate in the Sierra Nevada, California.** *California. Univ. University of California Publications in Geography*, vol. 11, **1955.** 218 p. 11 figs., 78 + 5 tables, bibliog. p. 195–213. **DLC, DWB**—In this thorough treatise on snow cover in relation to microclimate, terrain and vegetation in the Sierras, radiation climate and especially albedo of the various types of surfaces which go to make up the local climate are given considerable attention. It is shown how even comparatively small errors in estimates of albedo may distort conclusions concerning large-scale as well as local climatic processes. Data are presented for the albedo of forests: crowns of conifers 7% for ultraviolet light, 6% for visible, 15% for near infrared, 5% for 2–5 microns (infrared), and 3% for 10 microns. In the Sierras, the snow does not remain long in the trees. Considering the albedo of the trees and of the snow on the ground, the albedo of the whole tree stand varies from 18% to 25%. The albedo of the snow itself is thoroughly reviewed: for fresh snow 75%–89%, but in winter it falls from 85% for 1 to 3 days old snow to 72% for snow 9 to 13 days old. In spring the snow albedo falls to 43% after 14 days, but the fall in albedo depends on temperature, snow crystal structure, deposition of pine needles, etc. Much of the radiation transmitted through the

trees is reflected by the snow and then absorbed in the trees. *Subject Headings:* **1. Albedo data 2. Albedo of snow 3. Albedo of forests 4. Bibliography on albedo 5. Sierra Nevada, Calif.**—*G.T., S.F.*

8G–152 551.521.14:551.501

Shackleton, H. R. and Quirk, A. L., **A contribution to the measurements of the earth's albedo.** Rhode Island. Univ. Upper Atmosphere Research Lab., Contract AF 19(122)-249, Scientific Report, No. 3, July 29, **1955.** 14 p. 5 figs. (incl. photos), ref., 2 eqs.—A balloon-borne instrumentation for the measurement of insolation at high altitudes as described in Scientific Report, No. 2 was modified for the purpose of making high altitude measurements of the irradiancy of a pyrheliometer due to the radiation reflected from the earth's surface, atmosphere and clouds. From the irradiancy an estimate of the earth's albedo has been deduced. The irradiancy was measured by a 50-junction Eppley global pyrheliometer which was mounted in an inverted position on the bottom of the instrumentation. A microammeter which was connected to the pyrheliometer was photographed at half-minute intervals during flight. Two additional cameras were employed to photograph the terrain and/or clouds. Two flights were attempted, only one of which was successful. The data were obtained above a thinning overcast. This condition is probably reflected in the results obtained. An initial value of approximately 60% was obtained for the earth's albedo. This gradually decreased during the succeeding two hours to 29%, presumably with diminishing cloud cover. This value of 29% apparently obtained throughout the remaining hour of flight, although recording during this period was intermittent. In view of both the incompleteness of data and the assumptions made in arriving at the result, it is difficult to ascribe a degree of error. Only an order of magnitude of albedo was sought, however. Since temperature corrections were not incorporated, the instrument error is of the order of 10% or less. (*Same item as* 7.7–155, July 1956, *MAB.*) *Subject Headings:* **1. Albedo of earth 2. Balloon albedo measurement.**—*A.A.*

8G–153 551.521.14:551.573:551.311.12

Schieldrup Paulsen, Herfinn, **Solstrålingens betydning for smeltning av sne og is.** [The significance of solar radiation for melting of snow and ice.] *Naturen*, Bergen, 79(3):66–73, **1955. DLC**—Glacial heat economy is discussed briefly. HOINKES and UNTERSTEINER's field observations in the Swiss Alps, Aug. 21–31, 1950 and Sept. 3–9, 1951 show that ablation as controlled by the absorption of short wave solar and sky radiation was 81.0 and 58.2%, respectively. Nocturnal radiation was positive when measured under a low, dense cloud cover. The estimated albedo, varying from 0.405 to 0.338 indicates a distinct diurnal variation. Direct measurement of the radiation balance is suggested. (*Same item as* 6.11–215, Nov. 1955, *MAB.*) *Subject Headings:* **1. Albedo of glaciers 2. Glacial ablation 3. Swiss Alps.**—*W.N.*

8G–154 551.521.14:523.5

Siedentopf, H. (*Astronomical Inst., Tubingen, Germany*), **Diffuse matter in the solar system.** (In: Kaiser, T. R. (*ed.*), **Meteors.** London, Pergamon Press, **1955.** p. 145–147. 5 refs., eqs.) **DWB**—Comparison of brightness of zodiacal light and solar corona shows the following values of albedo A of dust particles of radii up to a_1

$$A = 10\% \text{ for } a_1 = 100\mu$$
$$A = 3\% \text{ for } a_1 = 300\mu$$
$$A = 1\% \text{ for } a_1 = 1 \text{ mm}$$

Observable meteors generally have radii $>100\mu$, but brightness of zodiacal light and Fraunhofer corona comes from particles with radii from 1–100μ. *Subject Headings:* **1. Albedo of interplanetary dust 2. Meteor shower particle size 3. Zodiacal light intensity.**—*M.R.*

8G–155 551.521.14

†Stenius, Ake S:son (*Swedish Forest Products Research Lab., Stockholm*), **Influence of optical geometry and absorption coefficient on diffuse reflectance values.** *Optical Society of America, N. Y., Journal*, 45(9):727–732, Sept. **1955.** 5 figs. (incl. photo), table, 45 foot-refs., numerous eqs. **DLC**—The two-constant theory of diffuse reflection and transmission deduced by KUBELKA and MUNK is much used for the determination of the absorption coefficient of dyed materials. Although the theory is derived for diffuse illumination of the specimen, it is often applied to reflectance values measured with reflectometers for parallel incidence. If the diffusing material can be prepared in the form of a thin sheet, a means is given to control the validity of the theory with respect to the optical geometry of the reflectometer. Experiments made with the geometries $R_{D,0}$, $R_{b,D}$, $R_{0,45}$, and $R_{60,D}$, show that if the material is colored, only reflectance values obtained with diffuse incidence, as predicted by the theory, may be applied with great accuracy to the Kubelka-Munk theory. For white or light colored materials, the optical geometry of the reflectometer is of minor importance in

this respect. *Subject Headings:* **1. Diffuse reflection measurements 2. Reflectometers.**—*Author's abstract.*

8G–156 551.311.12:91.04(988)

†U. S. Arctic, Desert and Tropic Information Center, **Project Mint Julep (Investigation of smooth ice areas of the Greenland Ice Cap, 1953).** Its *ADTIC Publication* A-104a and A-104b, May **1955.** 2 v. Pt. 1, **Introduction, narrative and general reports.** 82 p. figs. (some fold.), photos. (Includes Hendrickson, Karl N. and Hudgins, Ronald C., **Meteorology,** p. 68–73.) Pt. 2, **Special scientific reports.** 100 p. figs. (some fold.), photos, tables, bibliogs. throughout. Contents of Pt. 2: Holmes, G. William, **Morphology and hydrology of the Mint Julep Area, Southwest Greenland,** p. 1–50. 22 figs. (some fold.), 8 photos, 2 tables, 26 refs. LaChapelle, Edward, **Ablation studies in the Mint Julep Area, Southwest Greenland,** p. 51–72. 5 fig., 2 tables, 13 refs. Wilson, L. R., **Minor surface features of Southwest Greenland Ice Cap,** p. 73–93. 26 photos, table, 11 refs. Wilson, L. R., **Snow and ice residues: cryoconite,** p. 94–100. 3 fig., 7 refs. **DWB**—In Pt. II, 0.51–72, ablation studies are discussed. The measurement of ablation, duration and character of ablation season, annual snow accumulation, evaporation, the firn limit, albedo, variation of ablation with altitude, etc., are treated. Quantitative data are given on charts, graphs and in tables. (*Same item as* 7.3–1, March 1956, *MAB.*) *Subject Headings:* **1. Glaciological expeditions 2. Project Mint Julep 3. Albedo of glaciers 4. Greenland Ice Cap 5. Glacial ablation 6. Greenland.** —*M.R.*

1956

8G–157 551.508.2:551.521.14

Ashburn, Edward V.; Pentoney, C. P.; Hohanshelt, Z. W. and Weldon, R. G. (*all, Naval Ordnance Test Station, China Lake, Calif.*). **Narrow pass band albedometer.** *Review of Scientific Instruments, N. Y.*, 27(2):90–91, Feb. **1956.** 2 figs., 3 refs. **DWB, DLC**—An albedometer which allows accurate measurements in narrow wave length bands (90 Å) anywhere from 4000 to 6500 Å is described and illustrated schematically and by a photograph. The incident radiation enters an integrating sphere. Narrow pass band filters can be easily adjusted between an opal glass window and the receiver. Previous albedometers allowed light to fall directly on the receiver from all angles so that filters could not be used successfully to obtain spectral albedo measurements. (*Same item as* 8.3–113, March 1957, *MAB.*) *Subject Headings:* **1. Albedometers 2. Spectral albedo measurements.**—*M.R.*

8G–158 551.521.14:551.45

Ashburn, Edward V. and Weldon, Rodney G. (*both, U. S. Naval Ordnance Test Station, China Lake, Calif.*), **Spectral diffuse reflectance of desert surfaces.** *Optical Society of America, Journal,* 46(8):583–586, Aug. **1956.** 4 figs., table, 10 foot-refs. **DWB, DLC**—The spectral diffuse reflectance of various types of desert terrain was measured at 500 Å intervals in the spectral range 4000 Å to 6500 Å. For all types investigated except basaltic lava, the diffuse reflectance increased with increasing wavelength of the incident radiation. In general, the diffuse reflectance at 6500 Å was approximately twice that at 4000 Å. The various types of surfaces showed large differences in diffuse reflectance; the values ranging from 0.03 to 0.74. Measurements made of radiance from a surface of brush and wind-blown sand showed that the reflection does not follow Lambert's law. *Subject Headings:* **1. Albedo of deserts 2. Deserts 3. Color of deserts.**—*Authors' abstract.*

8G–159 551.521.14:551.45 551.593.7:551.45

Coulson, Kinsell L., **Characteristics of solar radiation reflected from desert soil.** University of California in Los Angeles, Contract No. AF 19(604)-1303, Scientific Report No. 2, Sept. **1956.** 17 figs., 6 refs., eqs. **DWB**—Measurements of reflected light were made in the Nevada desert which was sparsely covered with low sage brush and mesquite. A photoelectric polarimeter with filters was used to measure at 0.365, 0.460, 0.515, and 0.625 mμ. The albedo increases with decreasing solar elevation; the albedo is about twice as large at an elevation of 22° as at 49°. This effect was about the same at all wave lengths. At azimuths from the sun of 0 to 90°, and also near 180°, the reflected intensity depends on the depression below the horizon. For azimuth from 90° to 160°, the intensity is nearly independent of angular depression. The albedo increases with wave length, and is greatest on the antisolar side and lowest on the solar side. This latter effect is attributed to shadows. The degree of polarization is attributed to shadows. The degree of polarizations was also measured, being a maximum toward the sun. *Subject Headings:* **1. Albedo of deserts 2. Spectral albedo measurements 3. Polarization.**—*S.F.*

8G–160 551.46:551.521.14

Cox, C. and Munk, W., **Slopes of the sea surface deduced from photographs of sun glitter.** *California. Univ. Scripps Institution of Oceanography, La Jolla, Bulletin,* 6(9):401–488, **1956.**

Contributions, n.s., No. 589. 27 figs., 27 refs., 3 tables, eqs. **DLC**—Aerial photographs were made of the sea surface near Hawaii during Aug. and Sept. A thorough review is given of the geometry of the reflections and of the significance of the radiance measured by densitometry of the photographs. The r.m.s. slopes, σ, computed from the measurements and are found to depend linearly on the wind speed. Many other statistics of the slopes are given. The sea surface glitter as seen from below the surface is concentrated in a smaller angle than when seen from above; the glitter seen from above is more luminous. The albedo of sunlight is nearly the same for a smooth sea as for a roughened sea (Beaufort 4 wind) for sun's zenith distances less than 65°. For larger zenith distances, the roughened sea has a lower albedo, e.g., less than 0.2 compared to about 0.6 at zenith distance 85°. The sea albedo for skylight (clear sky) is 0.10 for smooth sea, 0.08 for rough sea. For overcast sky the values are 0.05 and 0.043, respectively. The radiance of the sea surface due to skylight relative to sky radiance is computed for clear and overcast conditions. Near the horizon the rough sea is darker than the smooth sea, and for the overcast conditions the sea is also darker. If the sea were absolutely flat, there would be no visible horizon; for rough seas the brightness contrast against the horizon sky increases on windy days. The reflectivity and visibility of thin and thick oil slicks on the sea are discussed. (*Same item as* 8.5–17, May 1957, *MAB.*) *Subject Headings:* **1. Albedo of sea surface 2. Ocean roughness 3. Refraction 4. Radiance 5. Hawaii.**—*S.F.*

8G–161 551.521.14:551.578.46

Dunkle, Robert V. and Bevans, J. T., **An approximate analysis of the solar reflectance and transmittance of a snow cover.** *Journal of Meteorology*, Boston, 13(2):212–216, April **1956.** 3 figs., 3 tables, 11 refs., 23 eqs. **DWB**—Experimental measurements of attenuation in a snow cover do not give consistent results, hence calculations are based on SCHUSTER's ideal model for gaseous stars, assuming a homogeneous medium of constant optical density. The computed albedo of a pure snow cover ranges from 0.80 with particle size 0.001″ to 0.62 with 0.1″, thus decreasing with aging of snow cover. Variations occur owing to presence of impurities and with spectral distribution of sun and sky radiation. (*Same item as* 7G–221, July 1956, *MAB.*) *Subject Heading:* **1. Albedo of snow.**—*C.E.P.B.*

8G–162 551.521.3:551.576

Fritz, S., **Scattering and absorption of solar energy by clouds of large water drops.** *I.U.G.G. Association of Meteorology, Rome, Sept. 1954, Scientific Proceedings*, London, Butterworth, **1956.** p. 549–552. 4 figs. **DWB**—The scattering and absorption of solar energy by clouds of large water drops are discussed for the cases where absorption can be neglected and where absorption cannot be neglected. The former is applicable for visible and ultraviolet radiation incident on a cloud surface. The latter occurs when absorption is present as in the infra-red radiation of solar energy. The computation of albedo of the cloud is described and data showing the variation of albedo with zenith distance are presented. The results showing the absorption of energy as a function of wave length for an infinitely thick cloud and dependence of absorption on the product of water vapor and the mean free path are presented. *Subject Headings:* **1. Absorption by clouds 2. Absorption by water vapor 3. Albedo of clouds.**—*I.L.D.*

8G–163 551.521.14

Georgi, J., **Absorption der Sonnen- und Himmelsstrahlung an metallblanken und weissen Oberflächen.** [Absorption of sun and sky radiation on polished metal and white surfaces.] *Germany. Deutscher Wetterdienst. Instrumentenamt Hamburg, Technische Mitteilungen des Instrumentenwesens des Deutschen Wetterdienstes, New Ser.*, No. 2:14–20, **1956.** fig., table, 5 refs. eqs. **DWB**—A method of measuring reflection of the various components of solar radiation from nickel, chrome and magnesium oxide is described, and the measured values are tabulated. 36% of the total radiation is absorbed by nickel, 44% by chrome and 8% by magnesium oxide. The absorption is stronger for shorter wave lengths in the case of the metals and for longer wave lengths in the case of magnesium oxide. (*Same item as* 8.5–212, May 1957, *MAB.*) *Subject Heading.* **1. Albedo of metal surfaces.**—*G.T.*

8G–164 551.521.61

Iaroslavtsev, I. N. (*Tashkent Geophysical Obs.*), **Infrakrasnaia radiatsiia solntsa v spektral'nom intervale ot 0,8 do 3,5μμ.** [Infrared solar radiation in the spectral range from 0.8–3.5μμ.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizich.*, No. 8:984–990, Aug. **1956.** 6 figs., 7 tables, 8 refs. **DWB, DLC**—The purpose of this study of infrared radiation was to determine the order of magnitude of this radiation for Central Asia (Tashkent) and to evaluate the values of these magnitudes in the integral solar flux. The discussion and data (presented in tables and graphs) include the flux of direct infrared solar radiation, its functional dependence upon the height of the sun and the percent content of infrared radiation in the total flux, daily and diurnal flux of infrared radiation and the dependence of the mean monthly flux of direct infrared radiation upon the absolute humidity of the

atmosphere; and the albedo of artificial and natural soil covers. *Subject Headings:* **1. Infrared radiation 2. Albedo of vegetation 3. Tashkent, U.S.S.R.**—*I.L.D.*

8G–165 551.521.14:551.526:627.1

Kirillova, T. V. and Ogneva, T. A., **Osobennosti teplovogo balansa vodnoĭ poverkhnosti.** [Characteristics of the thermal balance of a water surface.] *Meteorologiia i Gidrologiia*, No. 4:41–46, April **1956.** 4 tables, 2 refs., 3 eqs. **DWB, DLC.** Eng. trans. available from Commonwealth Sci. and Ind. Res. Organ., 314 Albert St., East Melbourne C2, Victoria, Australia as its CSIRO–3263—The author presents the results of some experimental studies on the determination of the individual constituents of the heat balance of a water surface and their daily variations carried out during the summer of 1954 at the Tsimliansk reservoir. Data are presented on the diurnal variation of the total and reflected radiation and the radiation balance for the water surface and for areas along the reservoir sides; daily variations of albedo, variations of radiation with depth, and initial data for calculating heat loss values by evaporation and turbulent exchange for seven day averages during July 1954. *Subject Headings:* **1. Heat balance of water surfaces 2. Albedo of water surfaces.**—*I.L.D.*

8G–166 551.521.1

*†Liljequist, G. H., **Energy exchange of an Antarctic snow-field, Pt. A, Short-wave radiation.** *Norwegian-British-Swedish Antarctic Expedition, 1949–1952, Scientific Results*, Vol. 2, Pt. 1A, pub. Oslo, Norsk Polarinstitutt, **1956.** 109 p. 54 figs., 35 tables, 4 plates, 71 refs., eqs. **DWB**—This excellent monograph discusses the theory, instruments, exposure, records and interpretation of the records of short wave radiation made by Maudheim (71°03′S, 10°50′W) Expedition to Dronning Maud Land, Antarctica. The specific aspects covered in separate parts are: 1) direct solar radiation, 2) global radiation, 3) albedo of snow, 4) penetration of light into snow. A Moll-Gorczyński pyranometer was exposed face downwards to record the upward directed short wave radiation. Values for overcast of 90% in spring, 85% in summer and 85–90% in autumn were obtained. During fair weather, the albedo varies with solar altitude from 75–85% in summer, (due to large grains rather than thawing) though after a blizzard 90% would be recorded. With filters, a maximum of 97% was found for the yellow-green portion of the spectrum, with 92% for red and 96% for blue. This selective reflection from cloud to snow and back again accounts for the high albedo with overcast sky. Data on penetration of blue light into the snow leads to conclusion that the albedo depends somewhat on condition of snow below the surface for upward directed radiation is 40% of the downward (for blue light) down to 15 cm. Data are given in detail and compared with work of many other authors. *Subject Headings:* **1. Short wave radiation in Antarctic 2. Albedo of snow surface 3. Antarctica I. Norwegian-British-Swedish Antrarctic Expedition, 1949–1952.**—*M.R.*

8G–167 551.521.1

†**Meteorological aspects of solar radiation.** *Meteorological Magazine*, London, 85(1006):112–116, April **1956.** table, 11 refs. **DWB**—G. J. Day, opening the discussion, described the spectral distribution and intensity of solar radiation, the flux in free space, recent determinations of albedo of cloud, land and sea, and modifications of the remaining 60% by the earth and its atmosphere and effects on temperature and evaporation. Six estimates of the mean energy transport across lat. 40° ranged from 2.4–4.9 $\times 10^{27}$ erg/day. He then described instruments for measuring solar radiation. Altogether a useful short summary. The discussion dealt mainly with practical applications. (*Same item as* 7.10–166, Oct. 1956, *MAB.*) *Subject Headings:* **1. Solar radiation effects 2. Albedo. I. Day, G. J.**—*C.E.P.B.*

8G–168 551.521.14

Nagel, Max R., **Illumination, contrast, spectrum, and color conditions in an "average" outdoor scene as functions of ground reflectance, object orientation, and viewing direction.** *U. S. Wright Air Development Center, Wright-Patterson Air Force Base, Ohio, Technical Report*, No. 56-14, Aug. **1956.** 43 p. 29 figs. (some fold.), tables, 13 refs., eqs. ASTIA Document, No. AD 97137. **DWB** (M21.16 U589i)—In the report, an attempt is made to define the concept of an "average" outdoor scene for application in the development of photographic equipment and material. It consists primarily of a white sphere on a neutral gray or white ground under a clear sky at a sun altitude of 40 degrees. The distribution of illumination, reflection spectra, and color on the surface of such an object is investigated. The contrast (or exposure range) and the spectral uniformity of the illumination on the object are determined as a function of both the ground reflectance and the direction from which the object is photographed or viewed. *Subject Headings:* **1. Spectral reflectivity of ground 2. Aerial photography.**—*Author's abstract.*

8G–169 551.521.14:551.578.46

Ôura, Hirobumi, **A study on the optical and the acoustical properties of the snow cover.** *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Rome, 1954,* (*Trans-*

actions), 4:71–81, pub. **1956.** 5 figs., 8 refs., 3 eqs. **DWB** (M06 I611g S. Hyd, v. 4, 1954)—The snow cover does not always show perfect diffused reflection (type E) for the incidence of light. There are the diffused specular reflection (type C) and another reflection (type A) such that the nearer the angle of reflection approaches 90°, the higher the brightness of the snow cover becomes. By quantitative treatment, it is found that in reflection type E, the reflection from the deep places plays the main role while types C and A are due to the reflection from the shallow places whose depth is not more than ten times the size of the snow grain. The degree of polarization of reflected light for the incidence of the linearly polarized light increases with the angle of reflection and is nearly equal to the percentage of light reflected only at the boundary surface of the snow cover. The albedoes are in the range from 40 to 90%. The extinction coefficients in snow are in the range from 0.4 to 1.2/cm. The relation between these values and the number of snow grains in unit volume was investigated. It is found that the sound wave propagates mainly in air among the snow grains with the velocities about 180–300 m./sec. Velocity increases with the temperature and the grain size for the same density and with the decrease of density. The energy of sound reflected at the snow surface is about 10–40% of the incident. *Subject Headings:* **1. Albedo of snow 2. Optical properties of snow 3. Acoustical properties of snow.**—*Author's abstract.*

8G–170 551.521.14

*Penndorf, Rudolf, **Luminous and spectral reflectance as well as colors of natural objects (albedo and color of terrain features).** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 44, Feb. **1956.** 19 p. 5 figs., 5 tables, 8 refs., eqs. Also abridged version as: **Luminous reflectance (visual albedo) of natural objects.** *American Meteorological Society, Bulletin*, 37(4):142–144, April **1956.** table, 5 refs., eqs. **DWB, DLC**—The spectral reflectance of natural objects is taken from KRINOV's measurements. (*See* 8G–59.) Based on these data, the luminous reflectance (albedo) and the color parameters are computed for these objects. The results are compared with other published data. It is shown that most natural objects possess a dominant wavelength between 5700A and 5900A, i.e. in the greenish yellow part of the spectrum. Even for vegetative formations, as seen from a distance, the dominant wavelength is also in the greenish yellow spectral range, which is a surprising fact because one would expect a dominant green. This color is, however, a mixture of brown and green. The excitation purity of bare areas and soils is low (15–30%), but it is higher for vegetative formations (25–50%). Vertical formations such as forests, seen from directly above, reflect only a very small amount (2–3%) of the light which falls upon them from the sun and sky, but as seen from the ground their reflectance is much higher (about 8%). *Subject Headings:* **1. Spectral reflectivity 2. Albedo data.**—*Author's abstract.*

8G–171 551.521.14

Robinson, G. D. (*Kew Observatory*), **The use of surface observations to estimate the local energy balance of the atmosphere.** *Royal Society of London, Proceedings, Ser. A*, 236(1205):160–171, Aug. 2, **1956.** 11 figs., 3 tables, refs. **DLC, DWB**—In the course of establishing an atmospheric radiation balance at Kew for the period May 1953–April 1954, new estimates are made of the local albedo. The probable value for the albedo of the mean atmosphere at Kew is put at 0.445 (May 1953–April 1954), 0.43 (May–July 1953) and 0.495 (Nov. 1953–Jan. 1954); for the clouded part of the atmosphere albedo values of 0.56 (Kew mean) and 0.65 (Kew persistent overcast) are accepted. In addition to the values for total radiation, those for visual plus ultraviolet, for infrared radiation, and photometric albedo values are also estimated. *Subject Headings:* **1. Albedo of atmosphere 2. Albedo of clouds 3. Spectral photometric albedo.**—*G.T.*

1957

8G–172 551.521.14:551.573:551.311.12

Hubley, Richard C. (*Glaciological Hdqs. Office, U. S. Nat. Comm. for IGY, Wash., D. C.*), **An analysis of surface energy during the ablation season on Lemon Creek Glacier, Alaska.** *American Geophysical Union, Transactions*, 38(1):68–85, Feb. **1957.** 6 figs., 9 tables, 31 refs., 25 eqs. **DWB, DLC**—Using more refined techniques and instruments than were available to SVERDRUP (1935–36) or WALLÉN (1948), the author presents the results of studies of the energy transfer at a melting snow surface on Lemon Creek glacier, in the south side of the Juneau Ice Field, (elev. 4000 ft) 4 mi from Juneau during the summers of 1953–54. Data for all of the elements of the radiation regime are given in tables and curves and evaluated. Albedo was found to be greatly influenced by solar altitude and cloudiness (see HUBLEY, 8G–146). Corrections made after calibration of equipment showed lower values of albedo at low solar angles. On clear days the sunrise and sunset albedos were 1.23 ×that at noon—on cloudy days without fog the noon albedo was 1.15 ×that on clear days, and with fog 1.25 ×clear day albedos. These differences are due to large grains at snow surfaces; also there are diurnal changes in character of snow surface. A mean albedo of 0.70 was found for a complete snow cover, 0.52 for $\frac{3}{4}$ cover and 0.39 for $\frac{1}{2}$ cover. It was found that radiative transfer

o a glacier in spring is much greater if the firn line retreats earlier in the season, especially if the ce is dirty (as in the Alps). If the albedo is above a critical value given in a table for various cloud emperatures and insolation values (ranging from 0.83 to 0.16 for a range of cloud temperature of)°C at 800 ly/day to 0.16 for 5°C cloud temperature and 500 ly/day), then the surface will absorb nore radiation with overcast than with clear skies;—if less than the critical value the surface will ibsorb more with clear than with cloudy skies. Thus if air and cloud temperature is >0°C during ablation season, melting due to absorption of radiation will vary directly with frequency of overcasts. Energy exchange due to rain and to turbulent transfer is also calculated and evaluated. Turbulent transfer of heat was found to be the most important factor in ablation—especially during storms. Thus the number of warm storms in an ablation season determines the net mass budget of the glacier during the season. Rainfall is considered to be a negligible factor. *Subject Headings:* **1. Glacier ablation 2. Albedo of glaciers 3. Heat budget of glaciers 4. Energy exchange over glaciers 5. Lemon Creek Glacier, Alaska.**—*M.R.*

8G–173 551.501.7:551.521.14

Kuhn, P. M. and Suomi, V. E., **Airborne observations of albedo with a beam reflector.** (In: Wisconsin. Univ. Dept. of Meteorology, **Study of differential heating of air columns.** Contract Cwb-8666, Annual Report, Jan. 31, **1957.** Appendix B. (5 p.) 6 figs., 2 tables, 4 refs.) **DWB**—"To be published in **American Meteorological Society, Bulletin** (1958)." A conventional Eppley pyrheliometer was converted into a beam reflector by mounting it, upright, in the prime focus of a parabolic mirror. This unit, attached to an aircraft, provides a means of obtaining reflected short wave radiation from small areas such as fields, cities, lakes, etc. Results of albedo measurements over parts of South Dakota, Iowa and Wisconsin are given. *Subject Headings:* **1. Airborne albedo measurement 2. Eppley pyrheliometer.**—*Authors' abstract.*

8G–174 551.521.1

Möller, Fritz, **Strahlung in der unteren Atmosphäre.** [Radiation in the lower atmosphere.] *Handbuch der Physik*, Berlin, 48:155–253, **1957.** 38 figs., numerous foot-refs., bibliog. p. 253 (8 refs.), 29 tables, 32 eqs. **DWB**—The amount of solar radiation and its modification in the atmosphere (extinction, absorption, diffusion, reflection), and the propagation of long wave radiation in the atmosphere are considered in detail, and an atmospheric radiation balance is computed (diagram). Several factors influencing incoming and outgoing radiation are evaluated (absorption coefficients, turbidity, temperature and pressure effects, etc.), among them the albedo of clouds and of the earth's surface. Albedo values obtained by various investigators for different types and thickness of clouds, for different plant covers and ground surfaces, and different types of snow are tabulated and graphically presented. *Subject Headings:* **1. Solar radiation modification 2. Infrared radiation 3. Albedo data.**—*G.T.*

8G–175 551.593.7

Sekera, Zdenek, **Polarization of skylight.** *Handbuch der Physik*, Berlin, 48:288–328, **1957.** 20 figs., numerous foot-refs., bibliog. p. 327–328, table, 8 eqs. **DWB** (N236)—A thorough treatise on every aspect of skylight polarization, including theory, measurements and applications. The ARAGO, BREWSTER and BABINET points are considered, the MIE and RAYLEIGH theories and the radiative transfer theory discussed at length for a molecular atmosphere, a turbid atmosphere, etc. Actual variations in horizontal and vertical, for various sun heights, dispersion in narrow spectral ranges, twilight polarization and other anomalies such as due to KRAKATOA eruption included in treatment. The effect of ground inflection with a high albedo (0.80) on position of the neutral points is discussed and nomograms showing values for these positions under various albedos presented on p. 302–3. *Subject Headings:* **1. Skylight polarization 2. Albedo effects on neutral points.**—*M.R.*

8G–176 551.521:551.311.12

Untersteiner, N., **Der Wärmehaushalt der Gletscher. Ergebnisse der glazial-meteorologischen Arbeiten der Frankfurter Himalaya-Expedition 1955.** [The heat balance of glaciers. Results of the glacial-meteorological work of the Frankfurt Himalaya Expedition 1955.] *Umschau*, 57(12):366–369, June 15, **1957.** 6 figs., 2 tables, 11 refs. **DLC**—Glacial economy is very complicated. Observations of heat balance were first made in the extremely continental climate of Central Asia by the Frankfurt Expedition in the region of the Chogo-Lungma Glacier in June July 1955. Global, solar and sky radiation with different cloud amounts and diurnal variation of radiation balance with albedo of 0.2 and 0.87 are shown. Over 90% of melting results from absorption of radiation during the day. Evaporation is very small. Conditions on Kårsa Glacier, Swedish Lappland and Vernagtferner are compared. *Subject Headings:* **1. Radiation balance 2. Glacier heat balance 3. Chogo-Lungma Glacier, Karakoram Mts.**—*C.E.P.B.*

8G–177 551.521.14

[Unannotated list of supplementary references on albedo.] The material listed below could not be readily located at the time this bibliography was prepared. It includes some of the more important contributions to the study of the albedo of various surfaces, which appeared in the Russian literature.

(1) Kulebakin, V. S., **Ob otrazhenii sveta ot zemnykh pokrovov.** [Light reflection from terrestrial surfaces.] *Gosudarstvenyĭ Eksper. Elektrotekhnicheskiĭ Institut, Trudy*, No. 17, p. 5.

(2) Skvortsov, A. A., **K voprosu o klimate oazisa i pustyni i nekotorykh osobennostiakh ikh teplovogo balansa.** [The climate of an oasis and of the desert, and a few peculiarities of their heat balance.] *Trudy po Sel'skokhosiaĭstvennoĭ Meteorologii*, Moscow, Vol. 20, **1928.**

(3) Kalitin, N. N., **Neskol'ko dannykh ob otrazhenii solnechnoĭ radiatsii ot zemnoĭ poverkhnosti dlia iuzhnykh kurortov.** [Data on solar radiation reflection from the earth's surface for southern health resorts.] *Kurortnoe (i Sanatornoe) Delo*, No. 1, **1929.**

(4) Tikhov, G. A., **Opticheskoe usilenie kontrasta pri aerofotos"emke.** [Optical intensification of contrasts in aerial photography.] Materialy 1-go Vesesoiuznogo soveshchaniia po aeros"emke 14–16 VI, 1929 g. *Leningrad. Tsentralnyĭ Nauchno-Issledovatel'skiĭ Institut Geodezii, Aeros"emki i Kartografii, Trudy*, No. 1:196–200, **1931.**

(5) Bylov, M. V., **Ob otrazhenii sveta ot estestvennykh poverkhnosteĭ.** [Light reflection from natural surfaces.] *Leningrad. Tsentralnyĭ Nauchno-Issledovatel'skiĭ Institut Geodezii, Aeros"emki i Kartografii, Trudy*, No. 4, **1931.**

(6) Markov, A. V., **Spektrofotometricheskie issledovaniia i ikh primeneniia k uluchsheniiu rezul'tatov aeros"emki i aeronabliudeniia.** [Spectrophotometric research and its application to the improvement of aerial photography and aerial surveys.] *Leningrad. Tsentralnyĭ Nauchno-Issledovatel'skiĭ Institut Geodezii, Aeros"emki i Kartografii, Trudy*, No. 4, **1931.**

(7) Tikhov, G. A., **Tsvetovye svoĭstva zeleni.** [Optical properties of vegetation.] *Leningrad. Tsentralnyĭ Nauchno-Issledovatel'skiĭ Institut, Geodezii, Aeros"emki i Kartografii, Trudy*, No. 4, **1931.**

(8) Krinov, E. L., **Spektral'naia otrazhatel'naia sposobnost' nekotorykh zemnykh obrazovaniĭ.** [Spectral reflectivity of various surfaces on the earth.] *Sbornik Stateĭ po Aerofotometrii*, No. 2, **1934.**

(9) Krinov, E. L., **Spektral'naia otrazhatel'naia sposobnost' prirodnykh ob"ektov s samoleta.** [Spectral reflectivity of natural objects from aircraft.] *Aeros"emka: Sbornik Stateĭ*, Leningrad, No. 8–9, **1934.**

(10) Sharonov, V. V., **Vizual'nye koeffitsienty iarkosti nekotorykh prirodnykh ob"ektov.** [Visual brightness coefficients of various natural objects.] *Aeros"emka: Sbornik Stateĭ*, Leningrad, No. 6–7, **1934.**

(11) Sharonov, V. V., **Otrazhatel'naia sposobnost' nekotorykh prirodnykh obrazovaniĭ.** [Reflective properties of some natural surfaces.] *Sbornik Stateĭ po Aerofotometrii*, No. 2, **1934.**

(12) Sharonov, V. V., **Rasseiianie sveta zemnymi obrazovaniiami i aerofotometricheskie metody ego issledovannia.** [Scattering of light by various surfaces on the earth and its investigation by aerophotometry.] *Sbornik Stateĭ po Aerofotometrii*, No. 2, **1934.**

(13) Tikhov, G. A., **Nekotorye spektral'nye svoĭstva neskol'kikh botanicheskikh i zoologicheskikh ob"ektov.** [Spectral properties of various vegetable and animal objects.] *Nauchnyĭ Institut imeni P. F. Lesgafta, Izvestiia*, Vol. 17–18, p. 475–482, **1934.**

(14) Tikhov, G. A., **O spektral'nykh koeffitsientakh rasseianiia.** [Spectral coefficients of scattering.] *Sbornik Stateĭ po Aerofotometrii*, No. 1, **1934.**

(15) Aleksandrov, B. P. and Kurtner, A. V., **Fizicheskie osnovy teplovogo balansa pochvy.** [Physics of the heat balance of the soil.] Gostekhizdat, **1935.**

(16) Krinov, E. L., **Zavisimost' spektral'nykh koeffitsientov iarkosti prirodnykh ob"ektov o napravleniia.** [Directional dependence of the spectral brightness coefficients of natural objects.] *Aeros"emka: Sbornik Stateĭ*, Leningrad, No. 5–6, **1935.**

(17) Kalitin, N. N., **Spektral'noe al'bedo zemnoĭ poverkhnosti na iuzhnom beregu Kryma.** [Spectral albedo of the ground surface on the southern shore of the Crimea.] *Voprosy Kurortologii*, Moscow No. 3/4, **1938.**

(18) Budyko, M. I., **O vodnom i teplovom balansakh sushi.** [On the water and heat balance of land.] *Meteorologiia i Gidrologiia*, No. 5, **1947.**

(19) Berliand, T. G., **Radiatsionnyĭ i teplovoĭ balans evropeĭsksoĭ territorii SSSR.** [Radiation and heat conduction balance in European USSR.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 10 (72), **1948.**

(20) Lopukhin, E. A., **K voprosu o roli radiatsii v zhiznedeiatel'nosti khlopchatnika.** [The role of radiation in the biological processes in cotton plants.] *Tashkent. Geofizicheskaia Observatoriia, Trudy*, No. 3, **1949.**

(21) Zubenok, L. I., **Izmerenie al'bedo nekotorykh rastitel'nykh pokrovov s samoleta.** [Measurement of the albedo of plant covers from aircraft.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 18(80), **1949.**

(22) Fesenkov, V. G., **Gornaia astrofizicheskaia observatoriia AN Kaz. SSR i nekotorye rezul'taty ee raboty.** [The astrophysical mountain observatory of the Kazakh SSR and a few results of its work.] *Akademiia Nauk Kazakhskoĭ SSR, Izvestiia*, No. 9, **1950.**

(23) Markov, A. V., **Otrazhatel'naia sposobnost' i pokazateli tsveta zemli i detaleĭ luny po elektrofotometricheskim primeram.** [Reflectivity and light indexes of the earth and of details of the moon according to electrophotometric samples.] *Abastumani, Astrofizicheskaia Observatoriia, Biulleten*, No. 11, **1950.**

(24) Orlova, N. S., **Opredelenie koeffitsientov iarkosti prirodnykh pokrovov.** [Determination of brightness coefficients of natural covers.] *Akademiia Nauk Kazakhskoĭ SSR, Izvestiia, Ser. Astrobotaniki*, No. 1–2, **1950.**

(25) Ostiakov, M. P. and Kozlova, K. I., **Spektral'naia otrazhatel'naia sposobnost' subarkticheskikh rasteniĭ.** [Spectral reflectivity of subarctic vegetation.] *Akademiia Nauk Kazakhskoĭ SSR, Ser. Astrobotaniki*, No. 1–2, **1950.**

(26) Tikhomirov, V. S., **Spektral'naia otrazhatel'naia sposobnost' reliktovykh rasteniĭ.** [Spectral reflectivity of fossil plants.] *Akademiia Nauk Kazakhskoĭ SSR, Ser. Astrobotaniki*, No. 1–2, **1950.**

(27) Lopukhin, E. A., **Priblizhennyĭ metod ucheta raspredeleniia summarnoĭ radiatsii sredi khlopchatnika.** [Approximate method of calculating the distribution of total radiation among cotton plants.] *Tashkent. Geofizicheskaia Observatoriia, Trudy*, No. 5, **1951.**

(28) Sulakvelidze, G. K., **Nekotorye radiatsionnye svoĭstva sukhogo snega.** [Radiative properties of dry snow.] *Akademii Nauk Gruzinskoĭ SSR, Soobshcheniia*, 12(8), **1951.** (*See* 8G–89)

(29) Alekseeva, N. A., **Obshchee i dlinnovolnovoe al'bedo nekotorykh tipov podstilaiushchikh poverkhnosteĭ dlia solnechnoĭ radiatsii.** [Total and long-wave albedo of various types of ground surfaces in respect to solar radiation.] *Leningrad. Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 8, **1952.**

(30) Kirillova, T. V., **O vliianii orosheniia na radiatsionnye kharakteristiki deiatel'noĭ poverkhnosti.** [The effect of irrigation on the radiative properties of an active surface.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 37(99), **1952.**

(31) Fedoseeva, A. I., **Al'bedo sistemy zemlia-atmosfera i ego raspredelenie po zemnomu sharu.** [Albedo of the system earth-atmosphere and its distribution over the terrestrial globe.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 41(103), **1953.**

(32) Gaevskiĭ, V. L., **K voprosu o roli al'bedo v formirovanii radiatsionnogo rezhima poverkhnosti.** [On the role of albedo in the surface radiation regime.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 39(101), **1953.**

(33) Kazachevskiĭ, V. M., **Fotometricheskoe opredelenie otrazhatel'noĭ sposobnosti Zemnogo shara.** [Photometric investigation of the reflectivity of the terrestrial globe.] Alma-Ata, **1953.** [Author's summary of his thesis.]

(34) Shifrin, K. S., **K teorii al'bedo.** [On the theory of albedo.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 39(101), **1953.**

(35) Forsh, L. F., **Otrazhenie solnechnoĭ radiatsii ot vodnoĭ poverkhnosti ozer.** [Reflection of solar radiation from the surface of lakes.] *Trudy Laboratorii Ozerovedeniia*, Vol. 3, **1954.**

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(37) Tikhov, G. A., **Spektral'nyĭ analiz rasteniĭ.** [Spectral analysis of plants.] *Akademiia Nauk SSSR, Doklady*, 57(7):673–676, **1947.**

SUPPLEMENTARY MATERIAL

1729

8G–178 535(09) **551.521.14**

Bouguer, Pierre, **Traité d'optique sur la gradation de la lumière.** [Optical treatise on the measurement of light.] Paris, H. L. Guerin & L. F. Delatour, **1760.** 368 p. **DLC** (QC353.B75). Trans. into Russian as **Opticheskii traktat o gradatsii sveta,** issued by Akademiia Nauk SSSR, **1950,** 478 p. tables, figs., eqs. Bibliog. of Bouguer's works [36 titles], p. 401–402. **DLC** (QC353.B758). First edition entitled, **Essai d'optique sur la gradation de la lumière,** Paris, **1729.** 167 p. **NN**—The Russian commemorative edition gives a sketch of Bouguer's life, a list of his works and extensive annotations on the treatise [based on the 1760 ed.] It calls attention to the fact that Lambert gets equal credit with Bouguer for laws which were published when Lambert was only an infant [1729]. Bouguer [1698–1758], a professor of hydrography at Havre, France, and a great ex-

perimental physicist, invented a photometer in 1725, and in succeeding years measured the relativ intensity of light from scores of types of direct and reflected sources and worked out the geometrica optics involved in each case. These are treated in his **Essai** (1729), and the work is supplemente in the 1760 edition [which appeared the same year as LAMBERT's famous work.] Of interest t meteorologists are chapters in Book 2 [on the amount of light reflected from rough and smoot surfaces], especially Pt. 3 on reflected light from mat surfaces, and Book 3 [on transmission of ligh through transparent and poorly transparent bodies such as water or the atmosphere] wherein th laws of transmission of light through the atmosphere were formulated exceedingly well for a centur or more. *Subject Headings:* **1. Photometry 2. History of optics 3. Albedo of rough surface I. Lambert, J. H.**—*M.R.*

8G–179 551.521.14:535.2

Lambert, Johann Heinrich, **Photometria sive de mensura et gradibus luminis, colorum e umbrae.** [Photometry or the measurement and scales of light, colors and shadow.] Augsburg E. Klett, **1760.** (16)+547+(13) p. 7 plates (fold.). **NNC, NN, ICJ**—German trans. by E Anding issued as **Lambert's Photometrie.** Leipzig, Wilhelm Engelmann, **1892.** 3 vol. (Ostwald' Klassiker der Exakten Wissenschaften, No. 31–33). **DLC** (QC391.L22)—In Pt. 6 of this classic treatise, Ch. 1 contains a discussion of the intensity of earthshine on the moon. In Sec. 1072 th albedo of the atmosphere is determined as 0.1, and total albedo of the earth (including reflectio from the earth's surface) is estimated as 0.12 to 0.14. These values were obtained by comparin atmospheric diffuse radiation with the brightness of white paper (whose albedo was estimated to b about 0.40) and by assuming that the amount of radiation diffused upward is equal to that diffuse downward. *Subject Headings:* **1. Albedo measurements 2. Photometry.**—*G.T.*

1861–1865

8G–180 551.521.14:523.4

Bond, George P., **On the light of the moon and of the planet Jupiter.** *American Academy o Arts and Sciences, Memoirs, n.s.,* 8(1):221–286, **1861.** tables, foot-refs., eqs. **DLC** (Q11.B68)– During the period March 24–June 12, 1860, the author made a number of photographic observatior of the light of the moon and of Jupiter at Harvard College. These, and previous photographi observations (made in 1851 and 1857 at Harvard) are carefully reduced and discussed at grea length to give relative values for the albedos of the moon and of Jupiter. These values are the compared with photometer observations of the albedo of the planets Jupiter, Venus, the moon, bric walls, a white painted house, white paper, trees, grassy slopes, dark weathered rock, dry earth sand, gravel, etc. The difference between the albedo of the central portion of Jupiter and the dark rim is noted. An average value of 0.68 is given for the albedo of Jupiter. All other values are give as ratios to the albedo of Jupiter. For instance, the optical albedo of the moon is considered to b $\frac{1}{11}$ that of the bright central portion of Jupiter and the "chemical" albedo $\frac{1}{14}$ that of Jupiter. Bric was $\frac{1}{8}$, landscape $\frac{1}{8}$, a white house $\frac{1}{2}$, white paper $\frac{1}{2}$, trees without leaves $\frac{1}{7}$, and black cloth $\frac{1}{19}$ a bright as Jupiter. The albedo of the moon is said to differ very little from that of the earth where Venus presents a brightness equal to that of the brightest cloud summits. The author surmis that the earth, if viewed from a distance, would appear dark at the center and very bright at th rim, owing to the higher albedo of the atmosphere than of the normal landscape. Snow woul appear as bright as white paper. Many variations in the albedos of the moon and planets fro time to time and in various portions, are noted. *Subject Headings:* **1. Albedo of Jupiter 2. Albed of landscape 3. Cambridge, Mass.**—*M.R.*

8G–181 551.521.14:535.2

Zöllner, Johann K. F., **Photometrische Untersuchungen mit besonderer Rücksicht auf d physische Beschaffenheit der Himmelskörper.** [Photometric investigations with special referen to the physical characteristics of celestial bodies.] Leipzig, Wilhelm Engelmann, **1865.** 322 7 plates, 15 tables, numerous foot-refs. **DLC** (QB135.Z85)—In the hundred years after the public tion of the classics of BOUGUER and LAMBERT, scientific photometry (of which they may be considere the founders) became almost completely forgotten. Zöllner developed an astrophotometer (includi colorimeter) based on polarization. The method of measurement is described in detail and resul are tabulated. Taking 0.700 for albedo of white paper as a reference value, the albedo of vario terrestrial objects is determined at a 20° angle of incidence (p. 273), among them fresh snow (0.78 sandstone (0.237), clay (0.156), moist earth (0.079), water (0.021), etc. Albedo values are al derived for various portions of the moon (average 0.1735) and for the planets. The theoretic part of the study includes detailed discussions of BOUGUER's and LAMBERT's conclusions regardi various problems connected with albedo and its measurement. *Subject Headings:* **1. Albedo measur ment 2. Photometer observation of albedo.**—*G.T.*

1901–1919

8G–182 551.521.14

Kimball, H. H., **Some causes of the variability of earthshine.** *Monthly Weather Review*, Wash., D. C. ,29(5):209–211, May **1901.** tables, foot-refs. **DLC**(QC893.A2)—In response to a request from G. E. LUMSDEN, Pres. of the Toronto Astronomical and Physical Society, the author has made detailed calculations of the albedo of the Pacific Ocean, most of North America and part of East Asia for March 22, 1901 (2300Z) at which time an unusually intense earthshine was noted on the moon by LUMSDEN. While the albedo of 50% for this quarter of the earth that would reflect to the moon is 15% above average (owing to seasonal excess snow cover over the continents and clouds over the Pacific), it was believed that nearness of the moon to the earth on this date, rather than excessive cloudiness, would explain the anomaly. *Subject Headings:* **1. Earthshine 2. Anomalous albedo.**—*M.R.*

8G–183 551.521.14:551.576

Abbot, Charles G. and Fowle, E. E., Jr., **Radiation and terrestrial temperature.** *Smithsonian Institution, Wash., D. C., Astrophysical Observatory, Annals*, 2:125–237, pub. **1908.** figs., tables, foot-refs. **DLC** (Q11.S74)—Vol. 2 of the **Annals** is devoted entirely to the extensive results of the second Solar Constant Expedition to Mt. Wilson, Calif. (elev. 6,000 ft) in 1906. Pt. I deals with the solar constant determinations and Pt. II with radiation and temperature of the earth. Ch. II of Pt. II gives results of measurements of the albedo of clouds made with a bolometric outfit mounted on a 50 ft tower overlooking on 3 sides the canyons filled with clouds whose albedo was being determined. Measurements on Aug. 22 and on Sept. 13, 1906 gave a mean albedo of 0.66, ranging from 0.61 to 0.76 (corrected for radiation), for all azimuths and a variety of zenith distances of sun. Using ARRHENIUS's values for cloudiness of the earth in latitudes 90°N to 90°S (52%) an estimated 34% of the radiation from the sun is lost by reflection from clouds. If the earth were completely covered with clouds, $\frac{2}{3}$ of the radiation would be lost. This radiation balance resulting from the cloudiness is discussed at length in Ch. IV (p. 159–176). The budget is broken down by clear and cloudy weather, low and high clouds, high and low levels of the atmosphere, high and low temperatures and various gases (e.g. CO_2 and H_2O vapor). *Subject Heading:* **1. Albedo of clouds.**—*M.R.*

8G–184 551.521.14:551.576

Aldrich, L. B., **The reflecting power of clouds.** *Smithsonian Miscellaneous Collections*, Wash., D. C., 69(10), **1919.** 9 p. fig., tables, foot-refs. **DLC**—An often quoted pioneer paper, giving results of over 100 separate measurements of cloud albedo, made above a stratus deck with a pyranometer (A.P.O. No. 5) suspended $\frac{1}{2}$ m below the bottom of a balloon basket, on Sept. 16, 1918 near Mt. Wilson, Calif. Clear sky prevailed above the 500 m thick stratus deck that the balloon traversed. Mean values for 11 groups of observations ranged from 70.2% to 90.0% with a mean value for the entire 106 determinations = 80.4% (mean of all groups having a probable error of 1.2% or less was 78.1%). Air mass ranged from 2.8 to 1.2. Little change in albedo was found with changing solar zenith distance from 33° to 69°. By using this value (78%), an average albedo for the earth of 43% was obtained compared with 34% obtained by ABBOT and FOWLE (*see* 8G–183). *Subject Headings:* **1. Albedo of clouds 2. Albedo of earth.**—*M.R.*

1923–1929

8G–185 551.521.14

Ramanathan, K. R., **On the visual and photographic albedo of the earth.** *Astrophysical Journal*, Chicago, 57(3):177–184, April **1923.** 4 tables, foot-refs., eqs. **DLC**—The total and spectral albedo values for the lower atmosphere, the clouds, land and sea estimated or obtained by RUSSELL, ABBOT and FOWLE, KIMBALL, and LUKIESH are discussed critically in the light of LUKIESH's airplane observations of terrain and RAMAN's theory of the color of ocean water (> $\frac{3}{4}$ of area of earth) and of scattering of light below the sea surface. The visual albedo given is 46% (composed of 7.5% from atmosphere above the dust level, 31.6% from clouds, 4.5% from lower atmosphere, and 2.5% from earth and oceans). The photographic albedo is given as 17%, 29%, 4.5% and 7% respectively, or a total of 57.5%. These values are said to agree with astronomically computed albedos of 45% and 60% respectively for visual and photographic albedo. *Subject Headings:* **1. Albedo of earth 2. Photographic albedo of earth 3. Albedo of sea surface.**—*M.R.*

8G–186 551.521.14

Büttner, K., **Messungen der Sonnen- und Himmelsstrahlung im Flugzeug.** [Measurements of solar and diffuse radiation from an airplane.] *Meteorologische Zeitschrift*, 46(12):525–527, Dec. **1929.** 3 tables. **DWB**—Values of albedo measured in flight with pyranometers (North Germany, Aug.–Sept. 1929) are tabulated as follows:

	Albedo (%)	No. of measurements
1. Sunlit cloud cover	60	(3)
2. Cloud cover under diffuse radiation (uncertain)	90	(2)
3. Water (North Sea)	9	(18)
4. Pastures, meadows, fields	14	(75)
5. Light deciduous and mixed forests	9	(14)
6. Coniferous forests	7	(2)
7. Very dark extensive mixed forests	4.5	(2)
8. Heath	10	(5)
9. Light sand, breaking surf	26–63	(9)

Subject Headings: **1. Albedo measurement 2. Airplane observation of albedo 3. North Germany** —*G.T.*

1930–1936

8G–187 551.521.1

Kimball, Herbert H. and Hand, Irving F., **Reflectivity of different kinds of surfaces.** [**Pt. 1**] *Monthly Weather Review*, 57(7):291–295, July **1929.** 4 tables. And [**Pt. 2**] *Ibid.*, 58(7):280–282 July **1930.** 2 tables. **DWB, DLC**—In Pt. 1 the authors describe the instruments and condition under which measurements of the albedo of various types of terrain were made in cloudy weathe during 5 airplane flights from Bolling Field, D. C. over the Potomac River, the District of Columbia Baltimore and vicinity, in May and June 1929. The detailed values of albedo and the place and terrain conditions for each observation are given in tables and then the values are grouped with respect to 16 types of surface, height above surface (500–4,000 ft), filter used, etc. Values ranged from 3.4% over dark forests to 12.8% over bright sandy beach and 14.9 over white plowed ground No relation was found between albedo and height above ground of plane. Albedo measurements were also made on Feb. 1, 1928 over clear white snow. One run was out over the ocean to 20 m from shore, and one over the Blue Ridge Mountains. In Pt. 2 results of similar measurements on 3 flights from Feb. 1 to May 12, 1930, give values for snow, fields, forests, towns and Chesapeake Bay, using the same photometer as in Pt. 1. A 12″ snow had occurred at Washington on Jan. 30 (5.5″ on Feb. 1 on ground). Values of albedo of 89% were measured over a "very white field," whereas on Feb. 5, over a field with some snow the value was 15% and over forests with some snow 8% and 11%, respectively. Lowest values were 3% over green pine forest and <4% over Chesapeake Bay. *Subject Headings:* **1. Albedo of snow 2. Albedo of terrain 3. Airplane albedo measurement 4. Maryland.**—*M.R.*

8G–188 551.521.14

Milankovitch, M., **Mathematische Klimalehre und astronomische Theorie der Klimaschwankungen.** [Mathematical climatology and astronomical theory of climatic changes.] *Handbuch der Klimatologie*, Berlin, Vol. 1, Pt. A, **1930.** 176 p. **DLC** (QC981.H22), **DWB** (M8 H236h)—The earth's radiation balance is discussed on p. A66–A68. Assuming an albedo of 0.65 for clouds and 0.08 for the earth's surface (0.06 for water and 0.15 for deserts and snow cover), and accepting 52% (21% low and 31% high clouds) as the average cloudiness over the earth, the average terrestrial albedo (consisting of reflection from the earth's surface, low and high clouds and the atmosphere) is computed as A = 0.37. *Subject Heading:* **1. Albedo of earth.**—*G.T.*

8G–189 551.521

Kalitin, N. N., **Chto nuzhno zhdat' ot postanovki aktinometrichestikh nabliudeniĭ v poliarnoĭ oblasti.** [What is to be expected from an actinometric program in the Arctic.] *Arctica*, Leningrad, 2:25–37, **1934.** fig., 5 tables, foot-refs. French summary p. 36–37. **DLC.** Trans. into English by E. R. Hope, issued as *Canada. Defence Research Board, T 220 R*, Aug. **1956.** 11 p. fig., etc. **DWB**—Data showing the comparative amounts of solar radiant energy received on a horizontal surface in different months and different latitudes [0°, 50° and 80°N]; and possible, actual, and % possible on a horizontal and vertical surface at Treurenberg, Spitzbergen; relation between direct and scattered radiation received on a horizontal surface for different months; albedos of snow cover and radiation balance budget for snow cover at Slutsk are given in tables and graphs and discussed. It is shown that diffuse radiation and terrestrial radiation measurements are vital in the Arctic where cloud cover and snow cover is great and persistent, but such measurements are almost nonexistent [up to the time of writing]. The problem of the ice regime versus the radiation regime is the primary problem of Arctic meteorology. *Subject Headings:* **1. Arctic radiation balance studies 2. Actinometry in Arctic 3. Albedo of snow cover 4. Translations 5. Arctic. I. Hope, E. R.** (*trans.*).—*M.R.*

8G–190 551.521.14:551.463

Powell, Wilson M. and Clarke, George L., **The reflection and absorption of daylight at the surface of the ocean.** *Optical Society of America, Journal*, 26(3):111–120, March **1936.** 4 figs., table, foot-refs. **DLC** (QC350.O6)—A pioneer paper on the subject of light reflected and absorbed by the surface of the upper layer of the sea. No previous measurements had been made under varied conditions. The radiation received (I) is divided into 3 components: A =light absorbed by the sea, R =light reflected by surface and U =light penetrating surface but scattered back by bubbles or particles below the surface. $I=A+R+U$. Photometers were mounted on a tower (painted black to minimize reflection from framework) 6 m above the sea in Buzzard Bay, Mass. Recording apparatus was on the power boat, connected to the photometers by rubber cables 100 m long. Red filters covered 6,000–7,000 Å region and violet the 3,100–4,500 Å light. The effect of the waves was negligible. Alternate measurements of I, and $R+U$ were made by turning the photometers alternately up and down. $R+U$ did not change appreciably with variation of distance above the sea from 3.5 m down to 1 m when the sea was calm. Submarine photometers in one case (calm sea, seen 35° from horizon) recorded a value of U amounting to nearly half of the total albedo. Other cases show greater or lesser values of U. Conclusion is that surface loss of energy is due in no small measure to a stratum of relatively opaque water just beneath the surface which increases with roughness of sea. Average of $R+U$ was 6.5% for cloudy days and 4% for clear days and was never more than 9% except at solar altitudes of less than 30° and clear sky. Waves increase value only 1 or 2% and clouds another 1 or 2 units. *Subject Headings:* **1. Albedo of sea surfaces 2. Buzzard Bay, Mass.**—*M.R.*

1941–1947

8G–191 551.521.14

Milankovitch, Milutin, **Kanon der Erdbestrahlung und seine Anwendung auf das Eiszeitenproblem.** [Canon of radiation on earth and its application to the ice age problem.] *Srpska Akademija Nauk, Belgrade, Posebna Izdanja* (i.e. *Academie Royale Serbe, Editions Speciales*), Vol. 132, **1941.** 633 p. 55 figs., 28 tables, numerous foot-refs., eqs. **DLC** (AS346.B53, Vol. 132)—In this monumental work an astronomical theory of the origin of Ice Ages is developed. Variations of solar radiation received on the earth are computed by considering secular migrations of the earth's poles. Radiation losses due to higher reflectivity during Ice Ages are incorporated into the theory (p. 576–626). The resulting amounts of radiation received at various latitudes are tabulated and graphically presented for the past 600,000 years. *Subject Headings:* **1. Ice Age theory 2. Albedo of earth.**—*G.T.*

8G–192 551.521.14:522.6:523.38

Dubois, J. E., **Le photomètre à oeil-de-chat et ses applications.** [The cat's-eye photometer and its applications.] *Ciel et Terre*, Brussels, 58(11/12):350–361, Nov./Dec. **1942.** 8 figs., eqs. **DLC** (QB1.C5)—The cat's eye photometer is described in detail. Light from the celestial object is led through two paths. In one path the light curves directly to the eyepiece; in the other path the light passes through a diaphragm (cat's eye) before being deflected by a prism to a position near the first image. The diaphragm is adjusted until the two images appear equally bright. The instrument is useful for comparisons of the dark and light side of the moon. Since the dark side is illuminated by the sunlight reflected to it by the earth, the photometer measures the brightness or albedo of the earth. The instrument can also be used to study eclipses of the moon in order to estimate the clarity of the earth's atmosphere. *Subject Headings:* **1. Cat's eye photometer 2. Albedo of earth 3. Lunar eclipses.**—*S.F.*

8G–193 551.521.14

Duntley, Seibert A., **The optical properties of diffusing materials.** *Optical Society of America, Journal*, 32(2):61–70, Feb. **1942.** 7 figs., 20 refs., eqs. **DWB**—Equations appropriate to depletion of an unscattered beam and of scattered diffuse light are presented. For each type of light there exists an absorption coefficient, a forward scattering coefficient and a backward scattering coefficient, making a total of six parameters. To these are added the reflections of the surface boundaries, making a total of eight optical constants to be used to compute the reflectance and transmittance of materials. These eight constants must be experimentally determined. Two instruments are described by which some of the optical properties may be measured. A comparison between theory and experiment for a yellow plastic shows that the author's theory predicts reflectance and transmittance better than SCHUSTER's two constant theory. *Subject Headings:* **1. Albedo 2. Transmittance 3. Absorption 4. Albedo instruments.**—*S.F.*

8G–194 551.521.14:523.323.6

Dubois, J. E., **Etude photométrique et colorimétrique de la lumière cendreé de la Lune.** [Photometric and colorimetric study of the light from the dark side of the moon.] *Ciel et Terre*, Brussels,

59(11/12):375–391, Nov./Dec. **1943.** 6 figs., 2 tables, foot-refs. **DLC** (QB1.C5)—Measuremer of the earthshine on the moon were made with blue, green, yellow and red filters. The seasor variation is independent of time of day, but the earthshine is brighter in the evening than in t morning; in the evening the moon "sees" the Atlantic Ocean sector of the earth, in the morning t European-African sector. Moreover, the brighter Atlantic sector shows less color difference betwe blue and yellow, than the continental sector. This is attributed to the presence of more cloudine over the ocean. A periodic variation of brightness during the day is attributed to the succession continent and ocean masses as seen from the moon. The earthshine is bluest when the brightness least, i.e., in Jan. and Nov. The earthshine is brightest during sunspot minimum. Most of t observations are explained as cloudiness effects, but the seasonal variation is attributed to sor other atmospheric effect. *Subject Headings:* **1. Albedo of earth 2. Diurnal variations of albe 3. Seasonal variations of albedo 4. Earthshine 5. Sunspot effects on albedo.**—*S.F.*

8G–195 551.521.14:551.5

Neis, B., **Albedo und Klima.** [Albedo and climate.] *Meteorologische Zeitschrift*, Brunswic 61(4):123–133, April **1944.** 5 figs., tables, 12 refs., 7 eqs. **DLC**—Assuming that the solar consta is really "constant," it is shown how changes in albedo, caused by changes in cloud amount over t earth, in turn caused by transitory oscillations in the general circulation, can produce significa persistent changes in the general circulation, which can produce climatic changes or variations considerable magnitude. The work is mainly theoretical but the author uses standard (at the tim values for cloud albedo (0.59), a mean cloudiness of 55% for the earth, and an albedo of 0.43 f the earth's atmosphere as a whole. He also assumes that the albedo during the glacial periods w 15% higher than today, with a mean cloudiness of 72% (during the Ice Age). *Subject Heading* **1. Albedo effects on climatic changes.**—*M.R.*

8G–196 551.526.6:551.521.

Kuz'min, P. P., **Teplovoĭ balans reki v period ee okhlazhdeniia.** [Heat balance of rivers duri their freezing period,] *Meteorologiia i Gidrologiia*, Leningrad, No. 5:68–75, **1946.** 4 tables, 12 refs 13 eqs. **DLC**—Freezing of rivers (such as the Oka or Volga which were studied in this articl depends first of all on the heat balance of the river in autumn just prior to the first ice formatio The albedo is a very important element in the heat budget. A formula and tables are presente for determining the albedo of direct radiation r_n from the height of the sun at noon, and the tot albedo γ from the observed cloudiness and from r_n:

$$\gamma = \frac{Q}{(Q'+q)} r_n + \frac{q}{(Q'+q)} r_p$$

For water it is assumed that the indirect albedo r_p is constant at 10%. *Subject Headings:* **1. Albed of rivers 2. Heat balance of freezing rivers.**—*M.R.*

8G–197 551.521.14:523.74

Dubois, J., **Sur l'albedo de la terre.** [Albedo of the earth.] *Bulletin Astronomique*, Pari 13(3):193–196, **1947.** 2 tables, 2 refs., eqs. **DWB**—For the period 1941–1946, the albedo of th earth in green light is 0.40; this based on lunar measurements reduced to a lunar phase of 115 The minima and maxima of albedo are given for each year, and separately for morning and evening minima occur in Jan. and Sept., maxima in June–July and Nov. The lowest value for Jan. wa 0.21 in 1945, the lowest for Sept. was 0.18 in 1944. The highest value for June–July was 0.56 i 1943, the highest for Nov. was 0.85 in 1942. Following the occurrence of the sunspot minimu in May, 1944, the albedo of the earth decreased by a factor between 2 and 3. The albedo in blu light exceeds the visual albedo by 0.1; the albedo in red light is 0.05 less than the visual albed *Subject Headings:* **1. Albedo of earth 2. Seasonal albedo variations 3. Sunspot effects on albed** —*S.F.*

8G–198 539.1

Weisskopf, Victor F., **Neutron diffusion.** (In: Goodman, Clark D., (*ed.*), **The science an engineering of nuclear power.** Cambridge, Mass., Addison-Wesley Press, Inc., **1947–.** Vo 1:87–97. 2 figs., 28 eqs.) **DLC** (TK9145.G6, Vol. 1)— A discussion of elementary diffusion theor including the concept of the transport mean-free-path for particles which do not scatter isotropicall The theory is applied to an infinite mass containing a joint source of neutrons, to the spatial distr bution of neutrons and to the effect of a reflector on the critical radius of a sphere of fissionab material. *Subject Headings:* **1. Diffusion theory 2. Neutron diffusion.**—*S.F.*

1951–1957

8G–199 551.521.14

Fritz, S. and MacDonald, T. H., **Measurements of absorption of solar radiation by clouds.** *American Meteorological Society, Bulletin*, 32:205–209, June **1951.** 4 figs., 2 tables. **DWB**—Measurements were made with Eppley pyrheliometers from a B-29 airplane at heights over 27,000 ft. The measured albedo varied from 0.61 to 0.77; the absorption by the clouds varied from 13% to 27% of the energy incident on the cloud top. (*Same item as* 3.5–187, May 1952, *MAB.*) *Subject Headings:* **1. Absorption by clouds 2. Albedo 3. Airplane measurement of albedo.**—*S.F.*

8G–200 551.521.14:523.43

Barabashev, N. P., **Ob issledovanii razlichnykh obrazovaniĭ na Marse.** [Investigation of various phenomena on Mars.] *Astronomicheskiĭ Zhurnal*, 29(5):538 555, Sept./Oct. **1952.** 7 tables, 13 refs. **DLC**—Detailed tabular and descriptive analysis of observations of the brightness (spectral reflectivity) or albedo of various "seas," "gulfs," "lakes" and "continents" of Mars, made by the author with blue, green and red filters in 1931, 1935, 1939, 1941 and 1950. Other observations were made in 1920, 1924, 1926 and 1930. Conclusions drawn regarding the atmosphere, surface covering in equatorial and polar regions and along the edges when the sun rises or sets or changed noon angle. The "seas" have regions of varying albedo and colors ranging from green to yellow to blue to reddish, and on the continents the albedo and shading changes with time of day. The "seas" become more reddish when the noonday sun is lower and more bluish when it is higher. On the continents the albedo in red is as high as .448, yellow .190 and green .193. (*Same item as* 5.3–168, March 1954, *MAB.*) *Subject Headings:* **1. Albedo of Mars 2. Planetary atmospheres.**—*M.R.*

8G–201 551.521.14

*†Landolt, Hans H. and Börnstein, Richard, **Zahlenwerte und Funktionen aus Physik, Chemie, Astronomie, Geophysik und Technik.** [Tables and equations in physics, chemistry, astronomy, geophysics and technology.] 6th ed. Vol. 3, **Astronomie und Geophysik.** Berlin, Springer, **1952.** 795 p. tables, charts, figs., bibliogs. **DWB, DLC** (QC61.L3)—Values of reflectivity are listed for different objects. On p. 88 visual and photographic albedo of the planets (including the earth) is given as well as that of a number of meteorites at various wave lengths from 400 to 680 mμ. Reflection of light from a sea surface is tabulated on p. 446 as a function of solar zenith angle, for violet and red light. On p. 689 albedo values are listed for some 30 different types of terrestrial surfaces, ranging from 4.5% for very dark mixed forest (Büttner) to 89% for fresh snow. *Subject Heading:* **1. Albedo data.**—*G.T.*

8G–202 551.521.14:551.521.64

Giovanelli, R. G. and Jefferies, J. T. (*Div. of Physics, Univ. of Sydney*), **The albedo for the atomic scattering of optical radiation.** *Australian Journal of Physics*, Melbourne, 7(4):570–573, Dec. **1954.** eqs. **DLC**—A general method for evaluating scattering is discussed for a multilevel atom. It is shown that, in the special case when the gas is either opaque or highly transparent to every other spectral line, the effects of interlocking on a given spectral line can be disregarded and the scattering readily computed. *Subject Headings:* **1. Albedo theory 2. Scattering of light.**—*Authors' abstract.*

8G–203 551.521.14:551.576

†Middleton, W. E. Knowles, **The color of the overcast sky.** *Optical Society of America, Journal*, 44(10):793–798, Oct. **1954.** 5 figs., 3 tables, 24 refs. **DWB**—The two-stream theory is used to compute the transmittance of clouds, including the effects of absorption and of reflection by the underlying ground. From actual measurements, it is shown that cloud water collected over industrial areas has absorption coefficients up to 100 times that of pure water at $\lambda = 0.3\mu$. For $\lambda > 6\mu$, the absorption coefficients are the same as pure water. However, in heavy overcast, the transmittance is not seriously affected by the absorption. Using spectral data for the extraterrestrial solar radiation, the author computes the spectral transmittance in the visible and near ultraviolet of clouds over grass, urban areas and fresh snow. Luminance and chromaticity are given. *Subject Headings:* **1. Two-stream theory 2. Albedo effects on cloud transmittance.**—*S.F.*

8G–204 551.521.6

Chu, Chiao-Min and Churchill, Stuart W., **Numerical solution of problems in multiple scattering of electromagnetic radiation.** *Journal of Physical Chemistry*, Wash., D. C., 59(9):855–863, Sept. 20, **1955.** 10 figs., 13 foot-refs., 105 eqs. **DLC**—The angular distribution of radiation by a particle is represented by six components. These are then substituted into a "transport" equation. Solutions are then presented for a parallel wave incident on a plane dispersing medium, and for a point source incident on the medium. Comparison with a "two-flux" model and with a diffusion model are

shown graphically. For $\alpha = 6$, where α is the ratio of particle circumference to wavelength, the two-flux and six-flux models agree closely, but both give higher transmission than the diffusion model. For other values of α the agreement is poor. The variation of transmission with angle of incidence, θ, of the light on the dispersing medium is given for the three models. For the six-flux model, the transmission varies from 0.65 to 0.35 for the case given. *Subject Headings:* **1. Transmission through a scattering media 2. Six-flux model.**—*S.F.*

8G–205 551.521.14:523.74

Dubois, J., **La variation de brillance de la lumière cendrée de la lune au cours du dernier cycle solaire.** [Variation of the brightness of the earthshine on the moon during the past solar cycle.] *L'Astronomie*, Paris, 69:242–246, June **1955.** 3 figs., 3 tables, 3 refs. **DWB**—On the basis of over 1400 observations since 1940, the seasonal variation of the brightness of the dark side of the moon is given. The brightness is generally a minimum in Jan.-Feb.; a secondary minimum occurs in July–Aug. The maximum brightness occurs in the period April to June, and again near Oct. The variation with sunspot cycle is given also. The observations are for green light, reduced to evenings in June. On a relative scale the following values of brightness are given: in 1943, 1.00; in 1946, 0.55; in 1953, 1.44. The maxima are said to occur almost exactly at the time of sunspot minima. [Note: This suggests almost a three-fold increase in the albedo of the earth from sunspot maximum (1946) to sunspot minimum (1954)]. *Subject Headings:* **1. Albedo of earth 2. Seasonal albedo variations 3. Solar cycle effects on albedo.**—*S.F.*

8G–206 551.521.1

Lileev, M. V., **Kharakteristika radiatsionnogo balansa i ego sostavnykh chasteĭ v raĭone Sverdlovska.** [Characteristics of the radiation balance and its components in the Sverdlovsk Region.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 50(112):88–110, **1955.** 12 tables, 2 refs. **DAWS**—This is a comprehensive study of the characteristics of the radiation climate of the Sverdlovsk district in the annual variation of the radiation balance at the earth's surface on the basis of instrumental balance observations over a period of 10 yrs and also of direct and diffuse radiation observations at the Sverdlovsk Geophysical Observatory. The paper includes the following: a description of the place of observation and installation of the instruments and their calibration, method of observation and working up of the data, direct solar radiation upon a horizontal surface, diffuse radiation, total radiation, absorbed total radiation, albedo, actual irradiation of an active surface and radiational balance of an extended surface. Data are given on the mean daily radiation balance and mean daily cloudiness, atmospheric temperature and absolute humidity and temperature at the soil surface; monthly totals of direct solar radiation upon a horizontal surface for each year from 1942 to 1952, monthly totals of diffuse radiation for the same period, monthly sums of total radiation, extremes of radiation; counter radiation of its atmosphere, albedo (mean decadal and monthly values); effective radiation and extreme daily total radiational balance. *Subject Headings:* **1. Radiation climate 2. Albedo data 3. Sverdlovsk Region, U.S.S.R.**—*I.L.D.*

8G–207 551.521.64:551.521.14

Gall, Ruth and Lifshitz, Jaime, **Albedo of cosmic rays in the earth's dipole and quadrupole magnetic field.** *Physical Review*, 2nd Ser., 101(6):1821–1824, March 15, **1956.** 8 figs., refs., 3 eqs. **DLC**—Albedo trajectories for protons of 0.5, 1.0, 1.5 and 2.0 Bev in the earth's dipole and quadrupole magnetic field were computed. The zenithal, azimuthal, latitude, and magnetic rigidity effects were studied. The quadrupole induces an asymmetry which seems only to be important near the geomagnetic equator. Shadow cones were obtained for one point of incidence. (*Same item as* 7D–211, April 1956, *MAB.*) *Subject Headings:* **1. Protons 2. Albedo for cosmic rays 3. Magnetic effects on cosmic rays.**—*Authors' abstract.*

8G–208 551.521.14:551.578.46

Miller, D. H., **The influence of snow cover on local climate in Greenland.** *Journal of Meteorology*, 13(1):112–120, Feb. **1956.** 5 figs., 2 tables, 49 refs. **DWB**—The influence of snow albedo, and other properties of snow, are evaluated in terms of heat storage on the Greenland Ice Cap. The albedo is estimated to be 0.84 just after storms, and drops to 0.70 or lower at the end of the five-day interstorm period. The average albedo over the interstorm period is about 0.75. (*Same item as* 7.8–224, Aug. 1956, *MAB.*) *Subject Headings:* **1. Albedo of snow 2. Heat balance 3. Greenland.**—*S.F.*

8G–209 551.521.32:535.6

Penndorf, R., **Colors of natural objects.** *Optical Society of America, Journal*, 46(3):180–182, March **1956.** 2 figs., 2 tables, 6 refs. **DWB**—The color, including luminance factor, dominant wavelength, λ_d, and purity are computed for many surfaces, from the basic spectral measurements of Krinov. The surfaces are water, bare areas and soils (including snow and ice cover), vegetative

formations, and roads and buildings. Water seen at a large angle appears blue, (λ_d = 4810 A); snow appears as a pure white. For all other objects, λ_d varies between 5700 and 5900 A; i.e., it ranges from greenish yellow to yellowish orange. This is presumably due to a mixture of green light from leaves and grass with brown light from branches, tree trunks and soils. For meadows, the color is nearly the same as measured from the ground or from a low flying airplane. For coniferous forests, the reflectance is 2–3% from the airplane, but about 8% when viewed from the ground. *Subject Headings:* **1. Albedo of earth's surface 2. Albedo of water surface 3. Spectral reflectivity. I. Krinov, E. L.**—*S.F.*

8G–210 535.2:551.521

Giovanelli, R. G., **Radiative transfer in discontinuous media.** *Australian Journal of Physics*, Melbourne, 10(2):227–239, June **1957.** 3 figs., 3 tables, 5 eqs. **DLC**—The theory of radiative transfer is applied to a scattering and absorbing medium consisting of randomly distributed spherical regions of uniform extinction and scattering coefficients x and σ, separated by free space. A general discussion of the diffusion of radiation through an infinite medium is followed by an approximate treatment of the semi-infinite case. It is shown that the reflectance may be very much lower than that of a uniform, continuous semi-infinite medium having the same value of σ/x; the reflectance is obtained as a function of σ/x and of the size and mean separation of the spherical regions. *Subject Headings:* **1. Radiative transfer 2. Reflectance.**—*Author's abstract.*

8G–211 551.521.14:016

†U. S. Snow, Ice and Permafrost Research Establishment, **Bibliography on snow, ice and permafrost with abstracts,** Vol. 1, Sept. 1951. Latest issue seen, Vol. 11, Jan. **1957.** Semiannual since Vol. 3, Jan. 1953. Cumulative Index, Vol. 1–8, issued Sept. 1955. Cumulative Index Vol. 1–10, issued Nov. 1956 [for items 1–14,000]. This is always its SIPRE Report, No. 12. Latest volume of abstracts has items 14,000–15,000. For previous abstract on whole series, through Vol. 7, *see* 6A–36. For abstract on Cumulative Index, Vol. 1–8, *see* 8.1–55. **DLC, DWB**—Abstracts of articles about the radiative and reflective properties of snow cover, ice, glaciers and other surfaces appear in each volume, together with numerous abstracts of the properties of these materials in general. A good subject index accompanies each volume. *Subject Headings:* **1. Albedo bibliographies 2. Snow, ice and permafrost bibliographies.**—*S.F., M.R.*

8G–212 551.521.14:551.507.362

Stroud, W. G. and Nordberg, W. (*Signal Corps Eng. Labs., Ft. Monmouth, N. J.*), **Meteorological measurements from a satellite vehicle.** (In: Van Allen, James A., (*ed.*), **Scientific uses of earth satellites.** Ann Arbor, Univ. of Michigan Press, **1956.** p. 119–132. 9 figs., 3 tables, 12 refs.) **DWB**—Among the meteorological observations which could be made from an earth satellite are albedo measurements with a photodetector. The satellite must be capable of giving orientation information. The theory, variations with latitude, time of day and season, and for various types of surfaces (snow, rock, vegetation, sea, clouds), for various wave lengths, cloud thickness, etc., methods and instruments, orientation and telemetering problems and operational requirements are discussed and illustrated with graphs, charts and diagrams. *Subject Headings:* **1. Satellite albedo measurement 2. Albedo data.**—*M.R.*

PART III. REVIEWS, TRANSLATIONS, REPRINTS, ROUTINE PUBLICATIONS, AND ANALYTICS FROM RECENT SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

Abbe, Truman: **Professor Abbe and the isobars.** N. Y., Vantage Press, 1955. 259 p. 14 plates. Review by O. G. Sutton in *Nature*, London, 178(4525):110–111, July 21, 1956. Review by Snowden D. Flora in *American Meteorological Society, Bulletin*, 37(7):376–377, Sept. 1956. (*For review on the original, see* 7.3–5, March 1956, *MAB.*)

Abbot, Charles Greeley: **60 year weather forecasts.** *Smithsonian Miscellaneous Collections*, Wash., D. C., 128(3), April 28, 1955. 22 p. 11 figs., 6 tables. Summary in *Cycles*, N. Y., 7(12):329–332, Dec. 1956. (*See* 7.2–105, Feb. 1956, *MAB.*)

The airglow and the aurorae: a symposium held at Belfast in Sept. 1955. Ed. by E. B. Armstrong and A. Dalgarno. London, Pergamon, 1956. 420 p. figs. (incl. many photos), tables, refs., bibliogs., eqs. Review in *Weather*, London, 12(6):197, June 1957. (*See* 8B–133, Feb. 1957, *MAB.*)

Alisov, B. P.; Drosdov, O. A. and Rubinshteĭn, E. S.: **Lehrbuch der Klimatologie** [Textbook of climatology]. Berlin, Deutscher Verlag der Wissenschaften, 1956. 536 p. 160 figs., plates, numerous tables, 137 refs. Review by C. E. P. Brooks in *Royal Meteorological Society, Quarterly Journal*, 38(356):282, April 1957.

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